FOOD MANUFACTURE

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP JULY 1, 1959

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Food Technology

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Ask for prices — you will be pleasantly surprised

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1. **Built for heavy duty by the oldest established heavy machinery specialists.**
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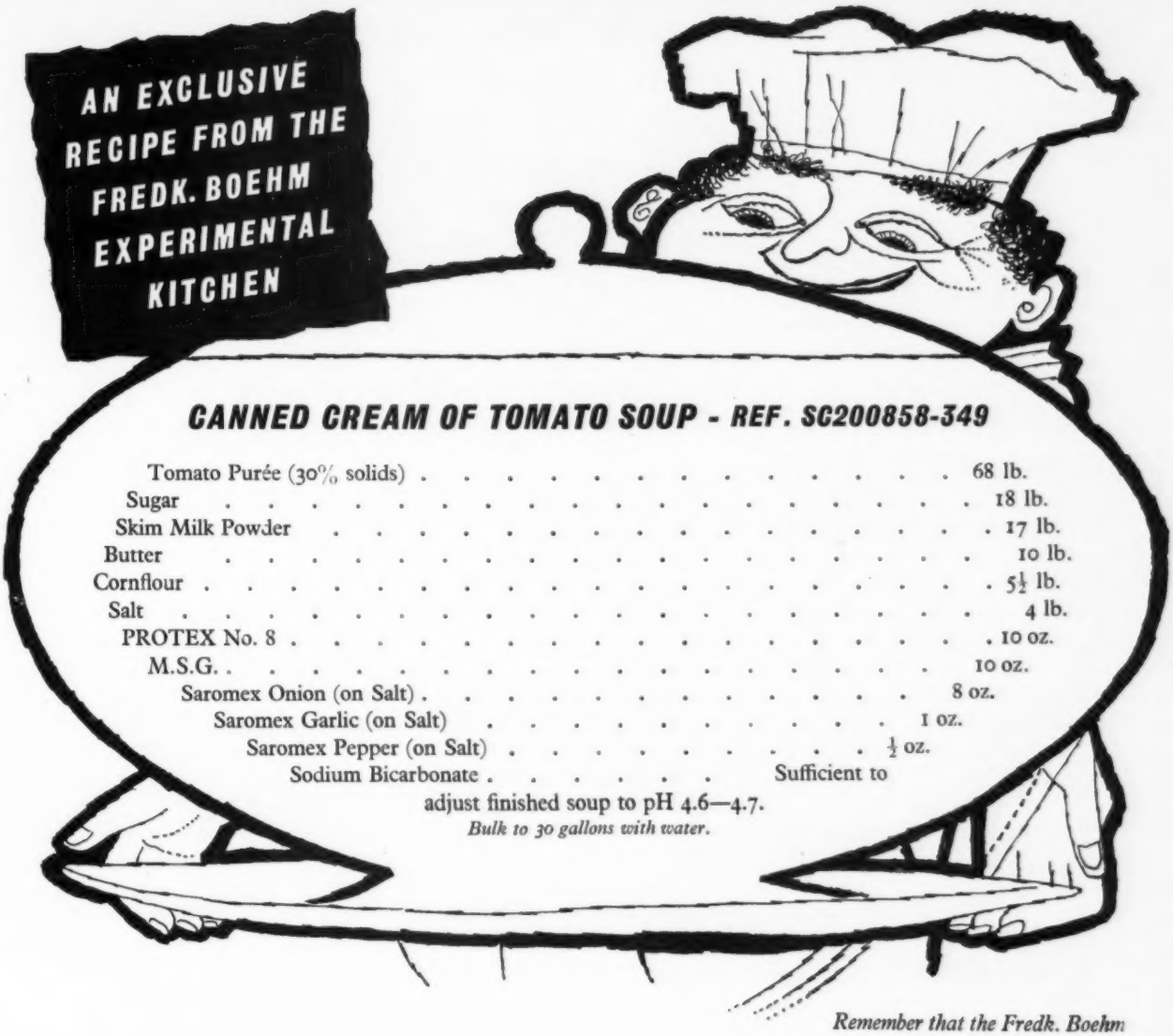

CANNED CREAM OF TOMATO SOUP - REF. SC200858-349

Tomato Purée (30% solids)	68 lb.
Sugar	18 lb.
Skim Milk Powder	17 lb.
Butter	10 lb.
Cornflour	5½ lb.
Salt	4 lb.
PROTEX No. 8	10 oz.
M.S.G.	10 oz.
Saromex Onion (on Salt)	8 oz.
Saromex Garlic (on Salt)	1 oz.
Saromex Pepper (on Salt)	½ oz.
Sodium Bicarbonate	Sufficient to adjust finished soup to pH 4.6—4.7.

Bulk to 30 gallons with water.

Bulk to volume and whisk vigorously in stainless steel steam-heated pan, fitted with a stirrer. Bring to the boil and simmer for 5 minutes. Homogenize at 1,500—2,000 p.s.i. and 180°F. and fill into plain No. 1 Tall cans at 200°F. Seal and process at 225°F. for 1¼ hours and water cool. The pH of the processed soup should be 4.6—4.7.

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VK44

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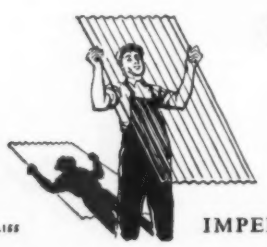

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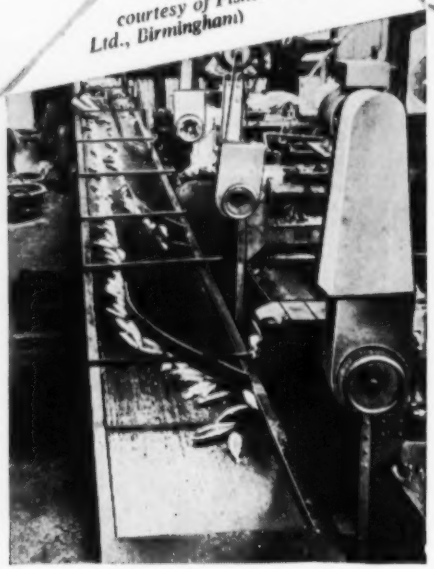
Fruit bottling on a 'Motaveyor' conveyor (by courtesy of J. Mawdsley Ltd., Wigan)



Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

As the pioneers of P.V.C. covered conveyor belting British Belting & Asbestos have supplied their SCANDURA belting for many varied applications. Due to its resistance to contamination and its hygienic qualities SCANDURA has become the obvious choice for food conveyor belting. Its lasting qualities had already been proved in food factories two years before its first introduction in Britain's coal mines in 1948, and its fire resistant properties have brought a hitherto unknown safety margin where conveyor fire hazards originally existed. SCANDURA is available now, in varying widths and thicknesses to suit all applications.

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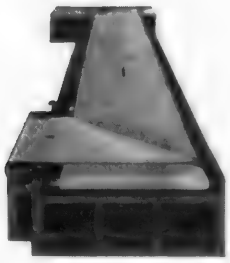

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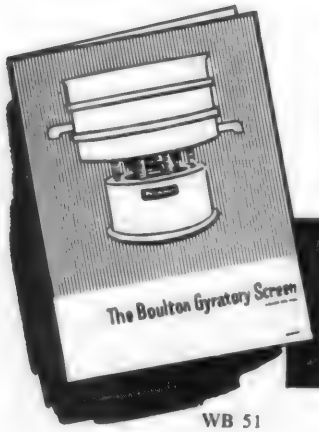

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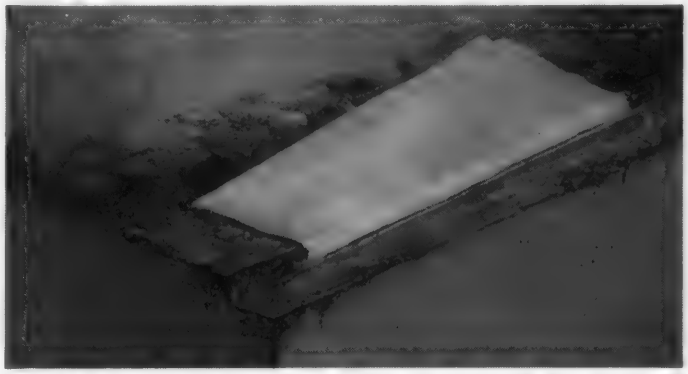
Now you can fulfil two objectives when decorating. Readers of this publication are probably familiar with the problems of fungi and mould growth on walls, ceilings and other painted surfaces. We know that in some trades it has become the accepted practice to decorate continually and clean in an attempt to control this serious menace.



PROOF! Photograph of a ceiling partly painted with Fungi-Chek. Test shows heavy mould growth, but the Fungi-Chek is completely free of growth.

Fungi-Chek (Gloss, Matt & Emulsion) Paints serve two purposes:

(1) they provide a decorative finish par excellence, with first class durability and resistance to steam, abrasion, acids and alkalis, etc.

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Fungi-Chek is entirely free from any toxic compounds of lead, arsenic, copper, mercury, tin or any harmful or poisonous chemicals, i.e. Fungi-Chek is non-poisonous and harmless.

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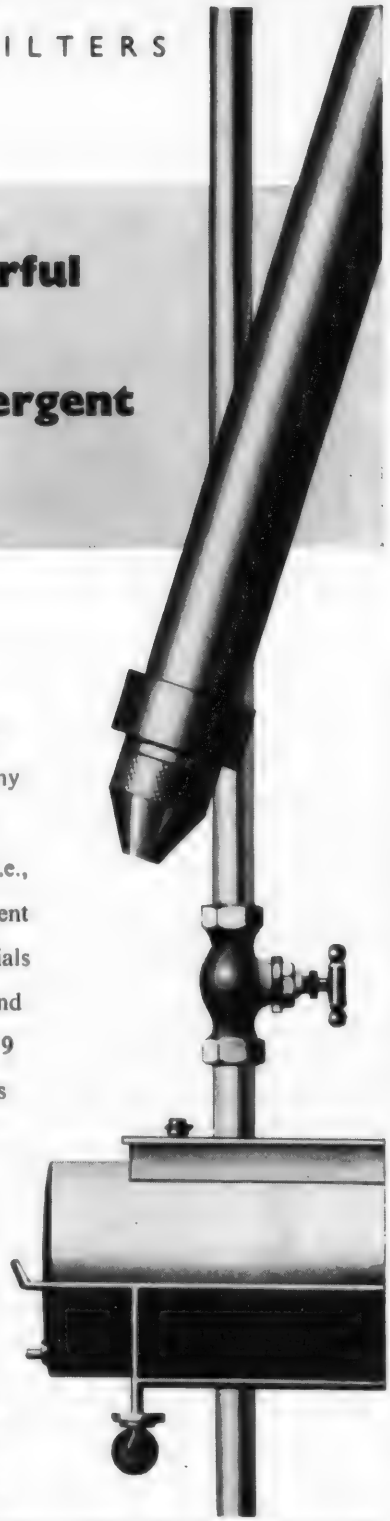

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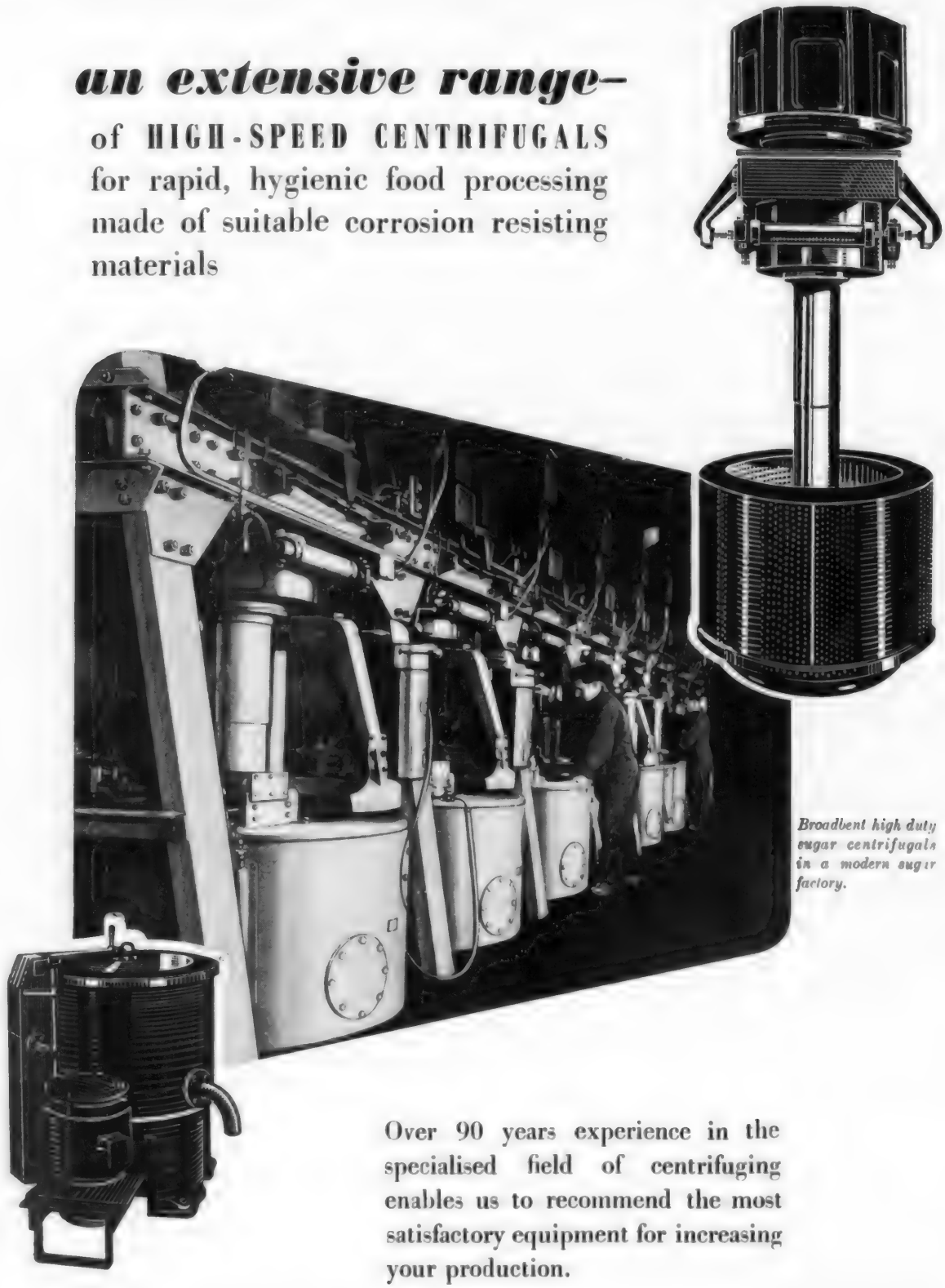

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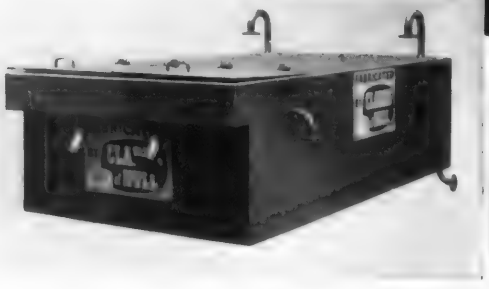

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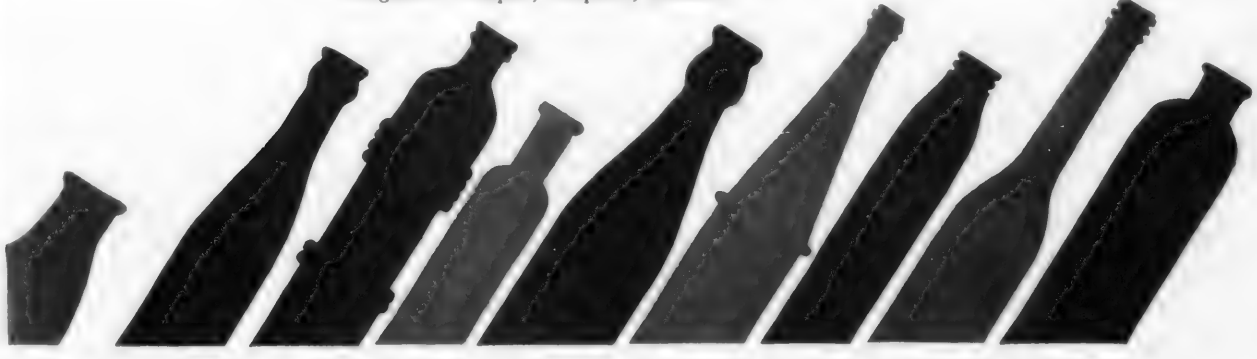

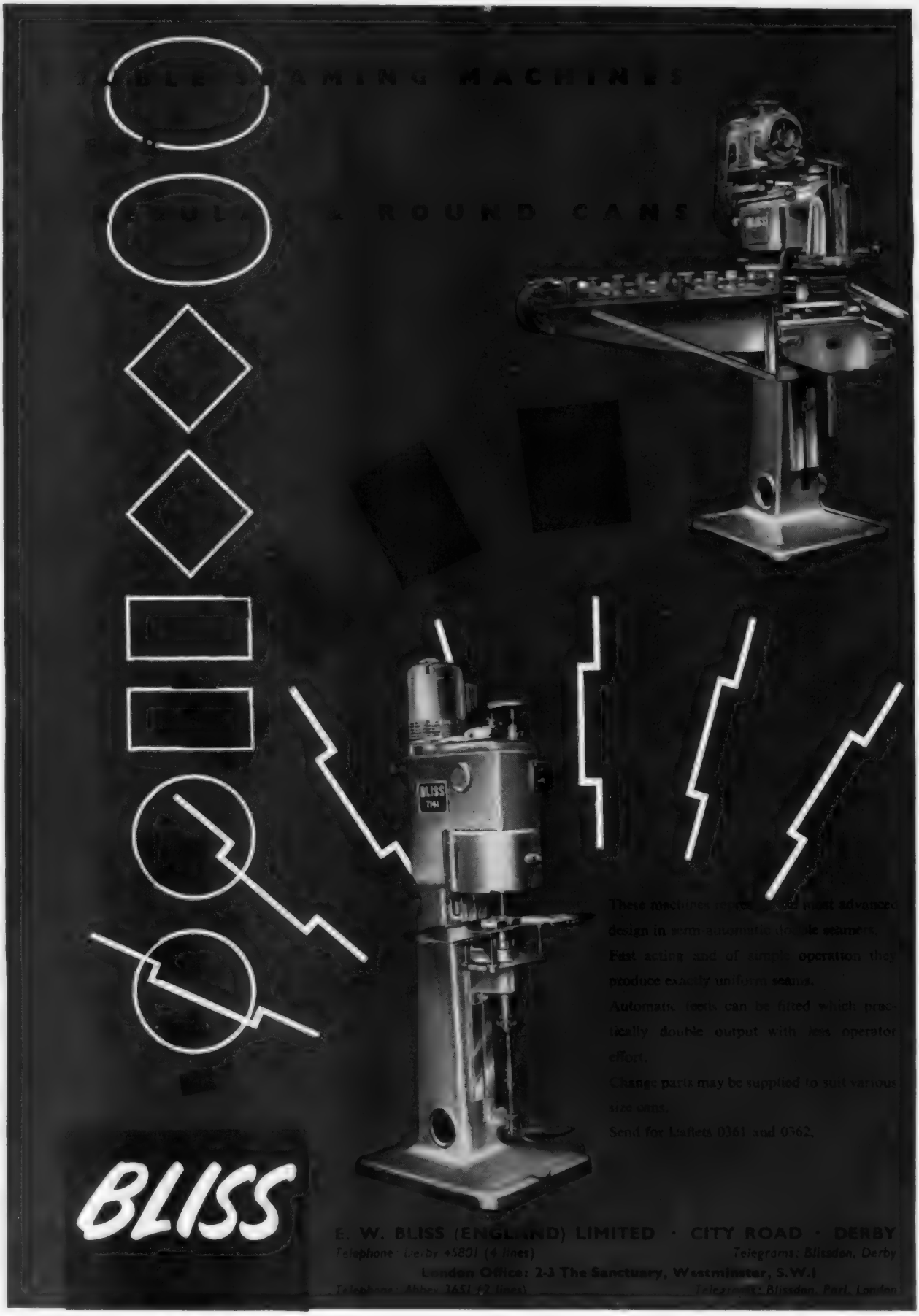
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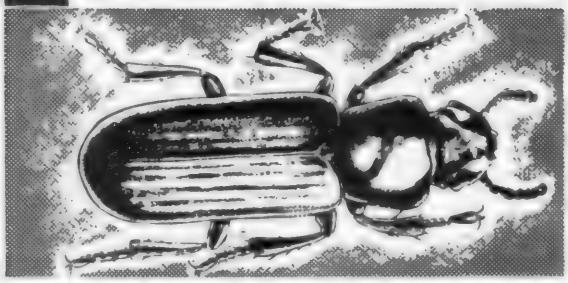
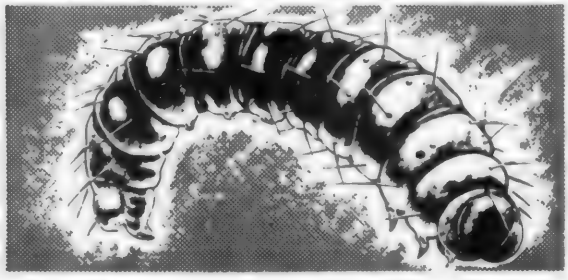


Flour Beetle (Actual size, approx. 4 mm)



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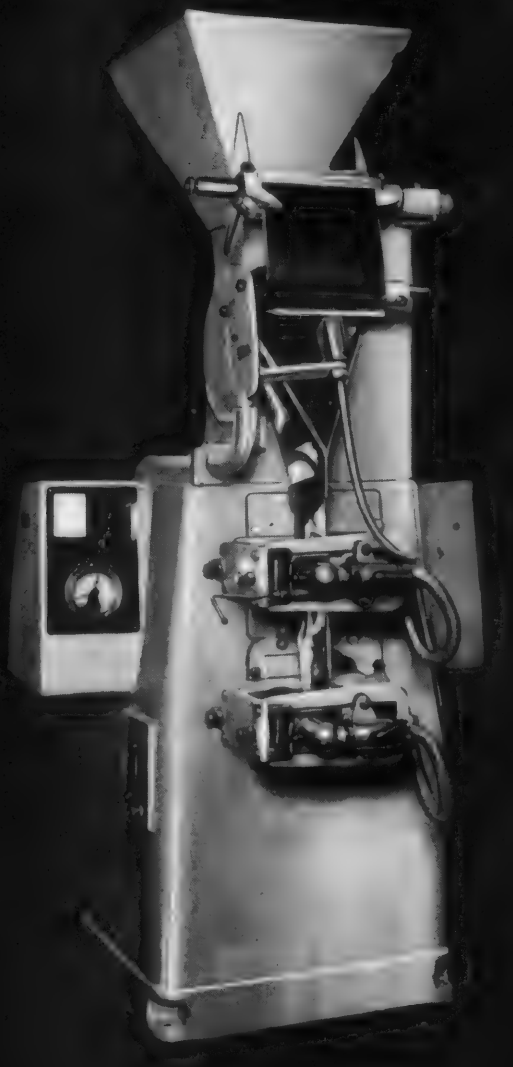

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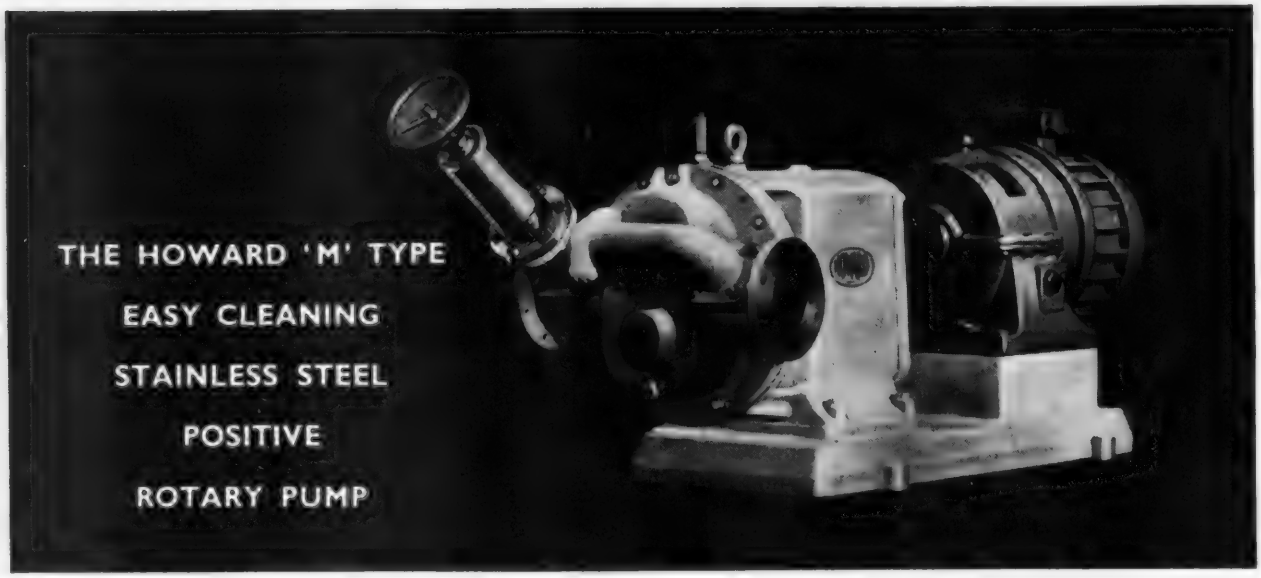

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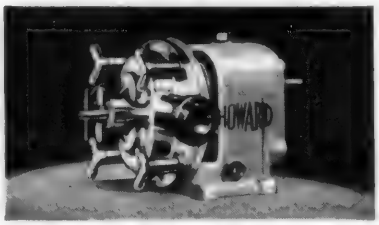

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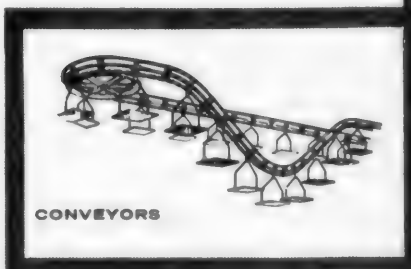

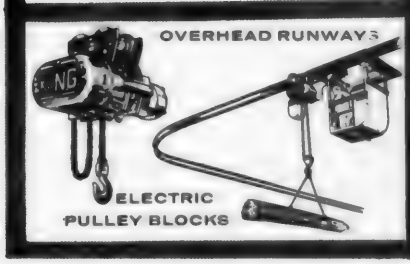

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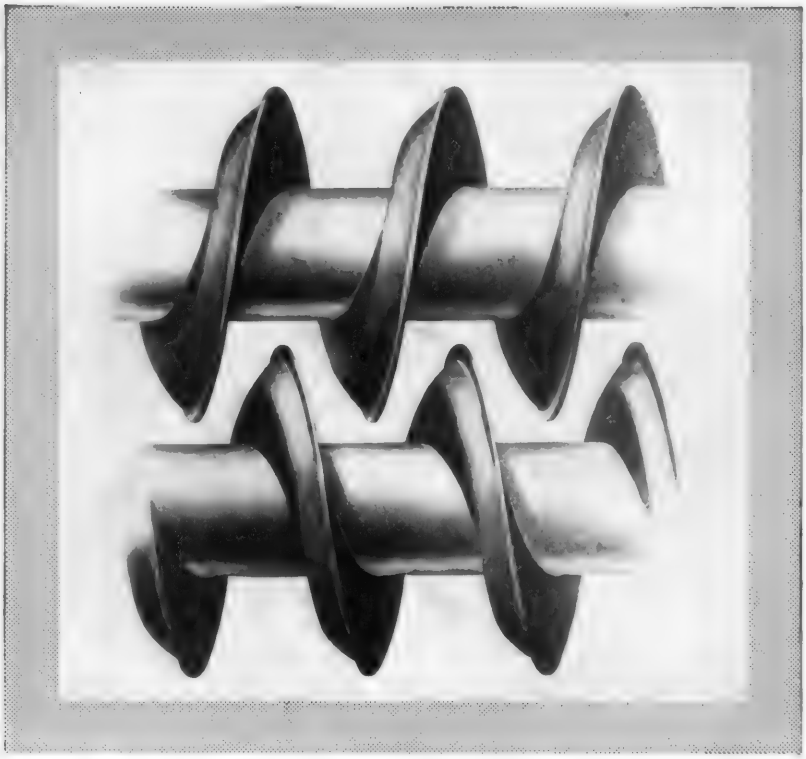

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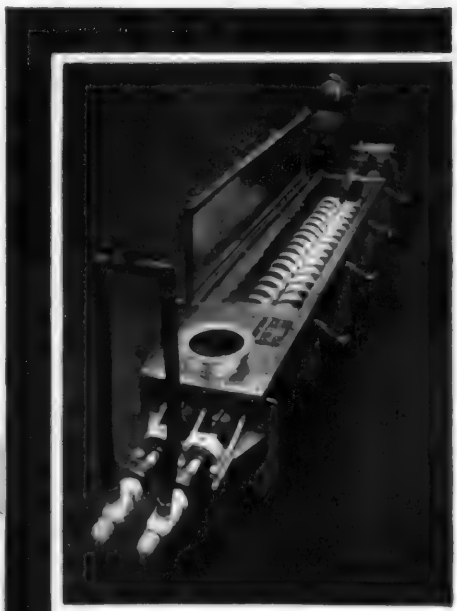

One of two 'Holo-Flite' Processors, Model ID78-4", supplied to Imperial Chemical Industries Limited.

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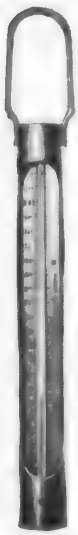
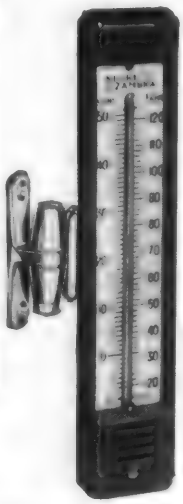


Dipping Thermometer
for hot water, etc.



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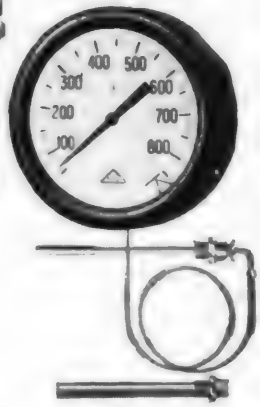
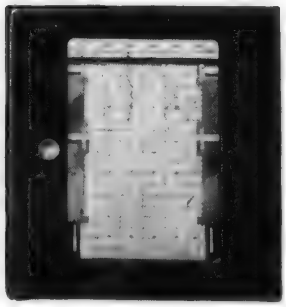
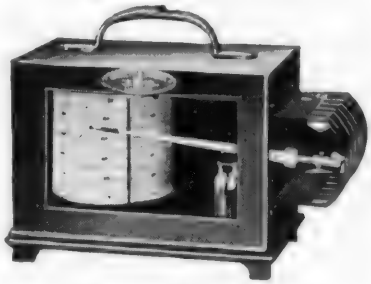


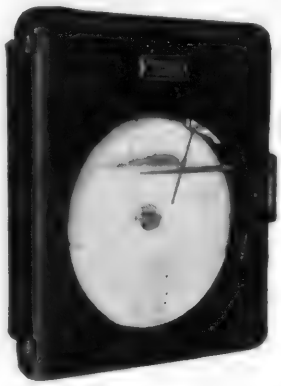
Distance-type Mercury-in-
steel Dial Thermometer



Resistance Thermometer
Recorder



Bi-metallic Recording
Thermometer



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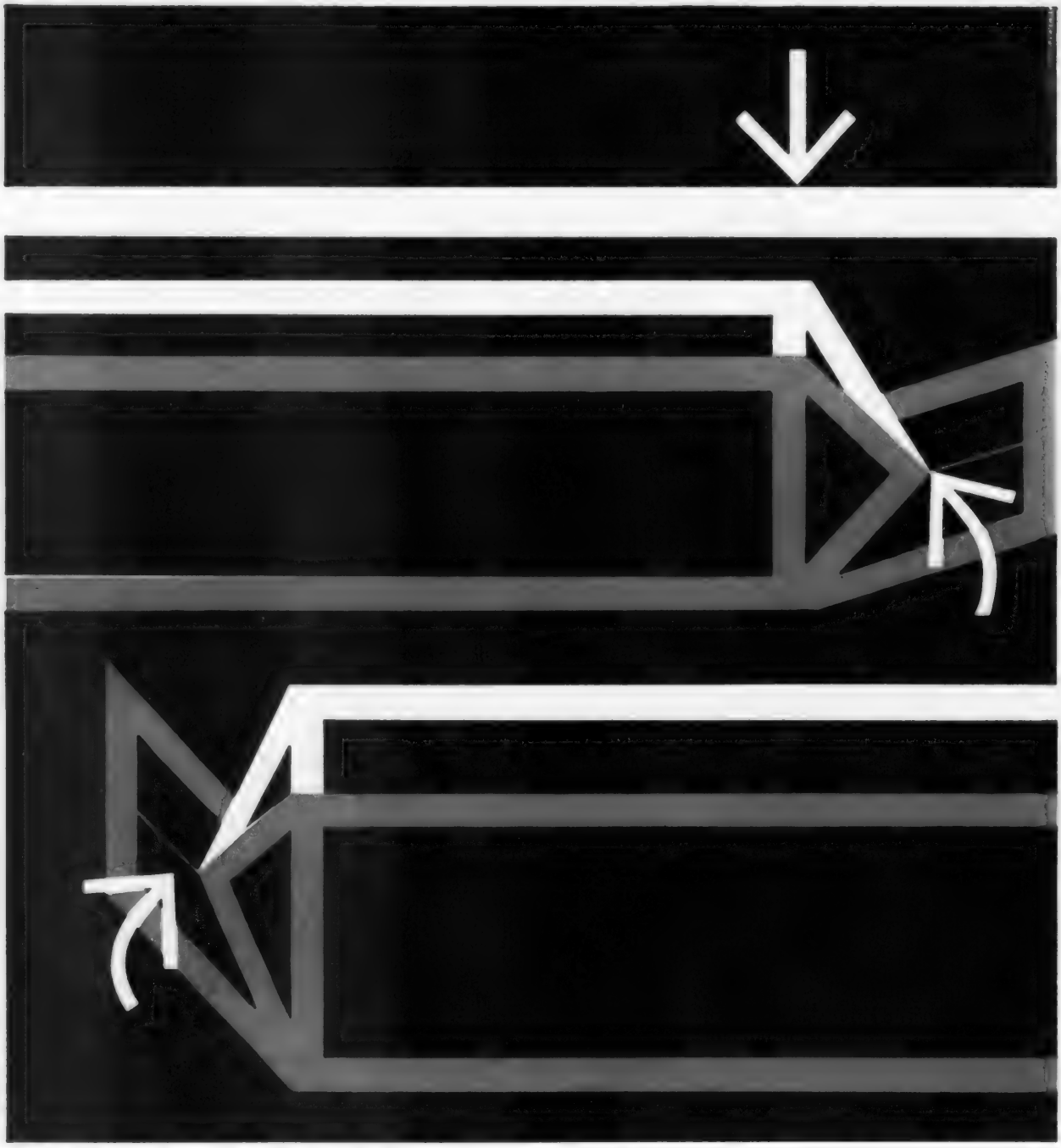

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for leaflet No. 200 for full details of the Reed Carton service. At the same time, put Reed to the test by sending them your cartoning query—the result will be a new look for your packaging and increased sales of your products.

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In the food industry, a customer's individual requirements are often quite out of the normal run of conventional cartons. To meet the uncommon need, the Reed design and research departments are freely available to investigate and to solve every particular packaging problem; this may sometimes involve a unique method of construction or assembly, or the use of a special board.

One such instance was the need by Marks and Spencer Ltd., for a range of quick erecting trays to be supplied in the flat with top quality printing at a competitive cost and to meet the varying requirements of different products. As a result, a range of cartons was produced which steadfastly preserved the inherent goodness and flavour of their contents while enhancing immeasurably their purchase appeal at the vital point-of-sale.

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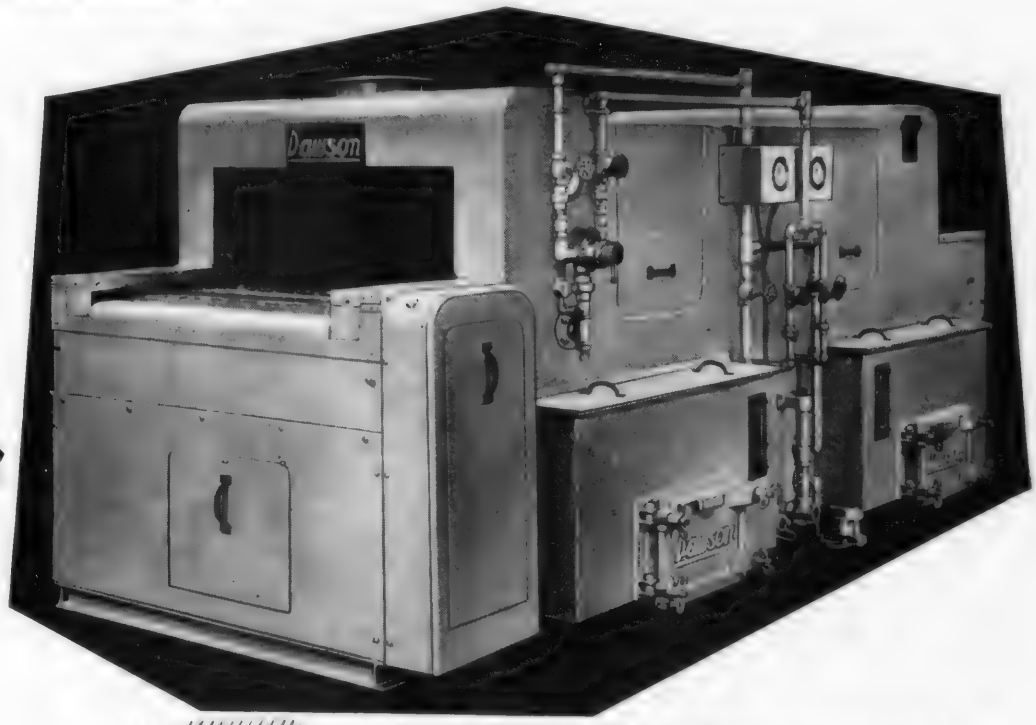

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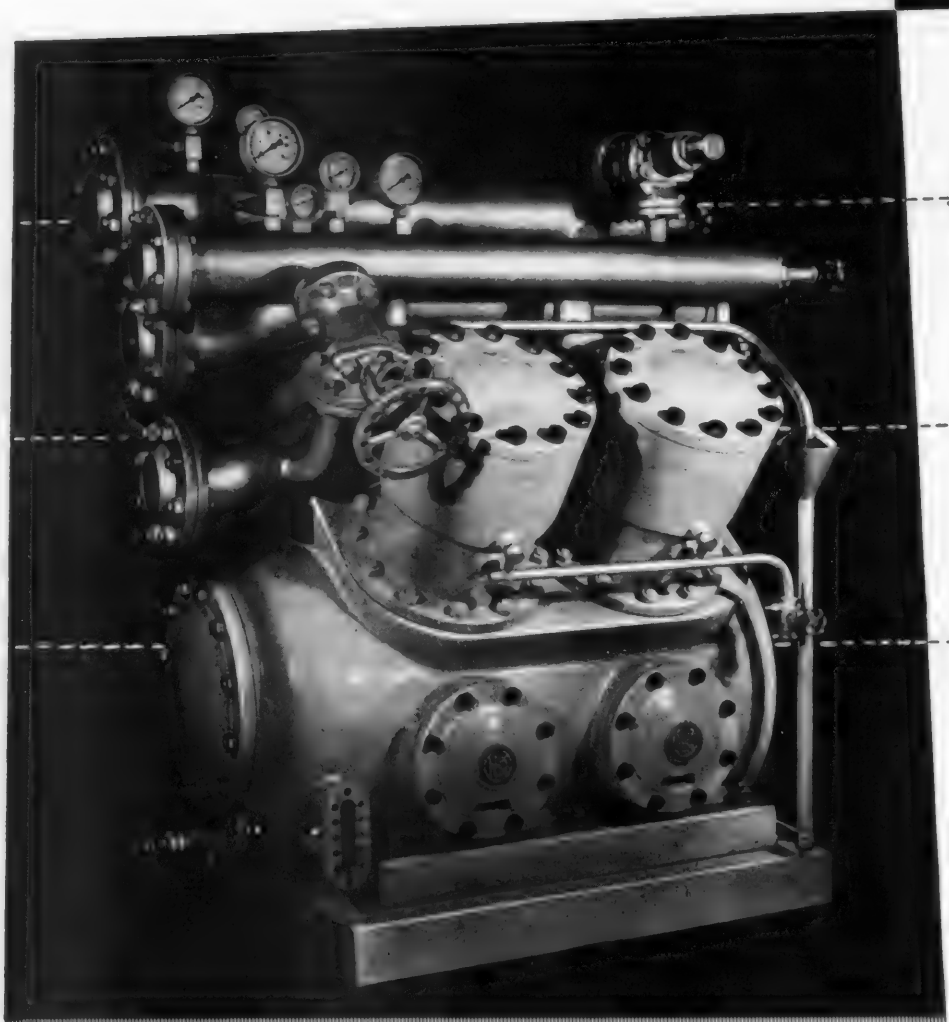

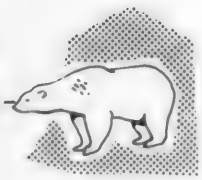

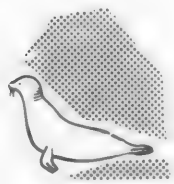

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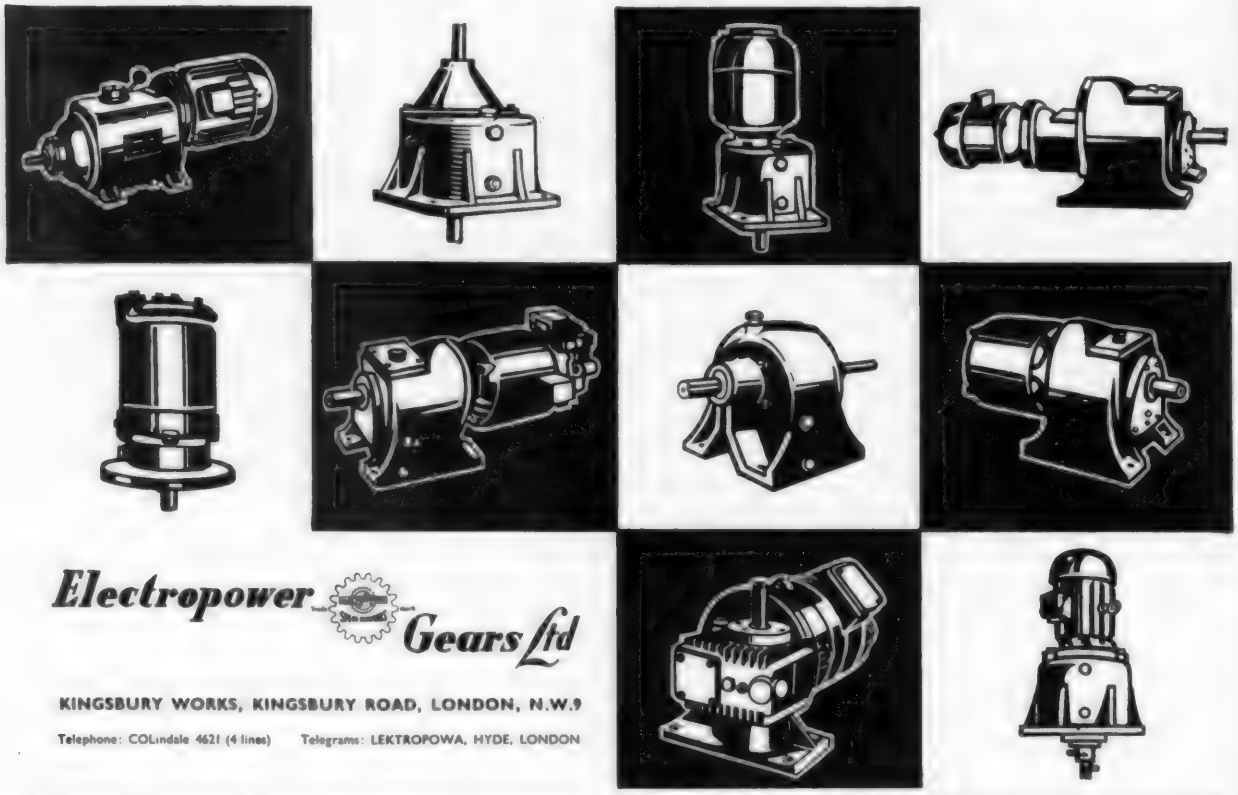

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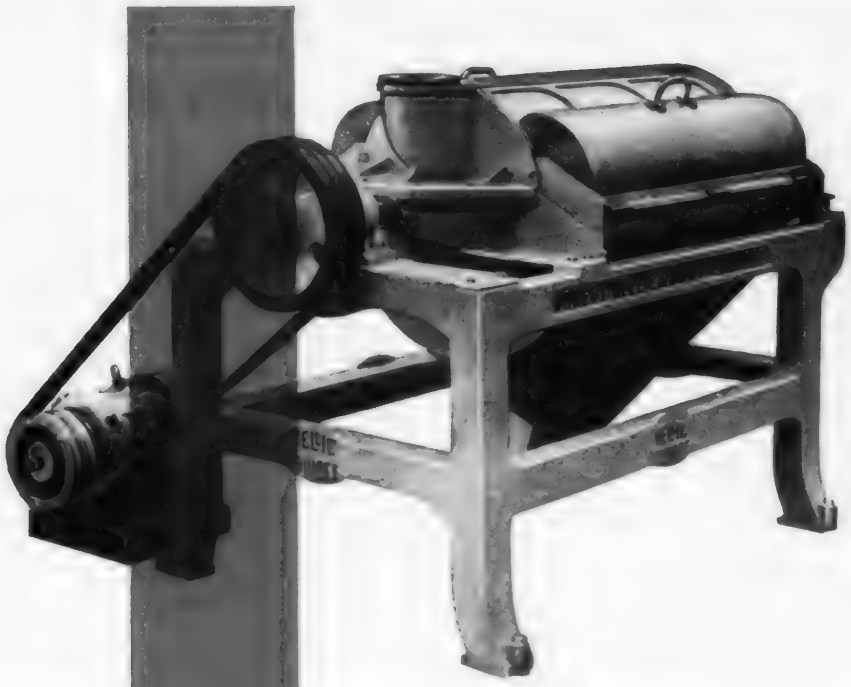

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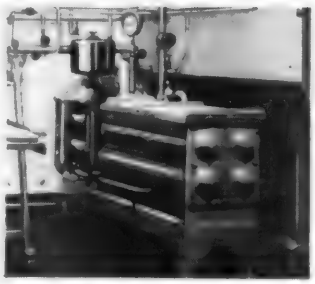

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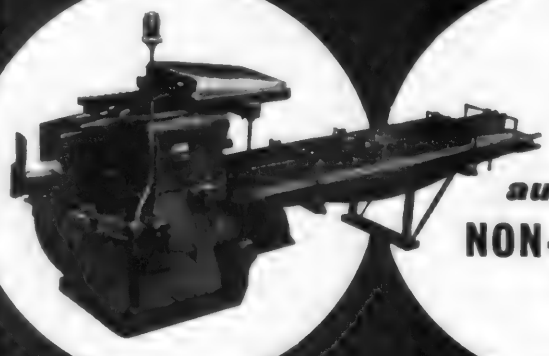

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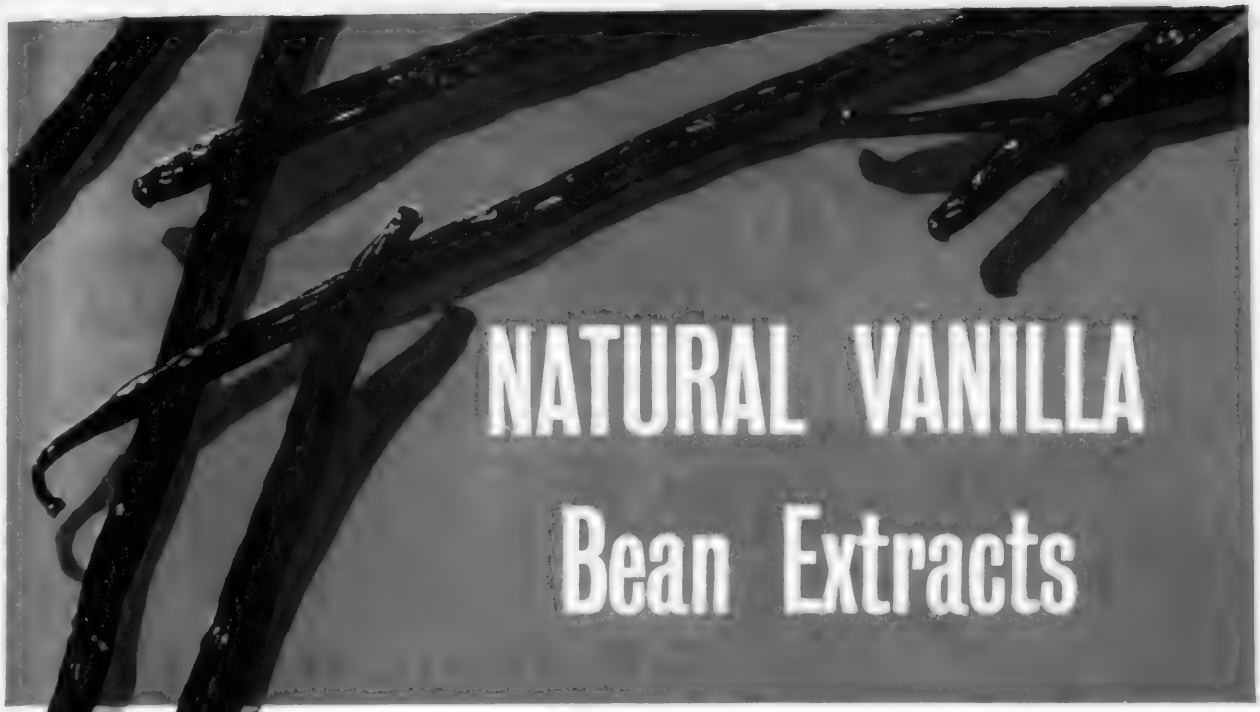

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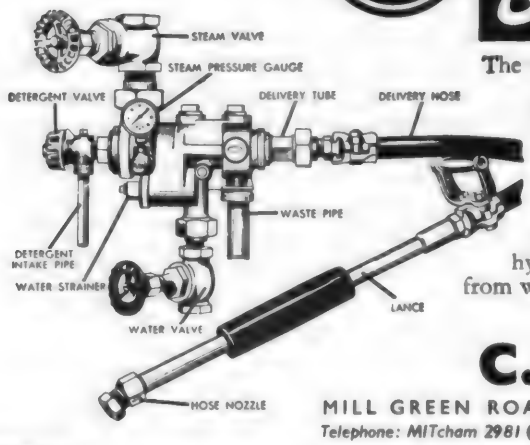

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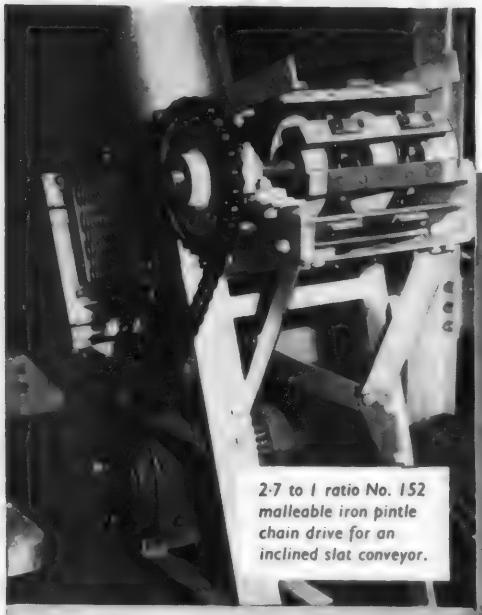

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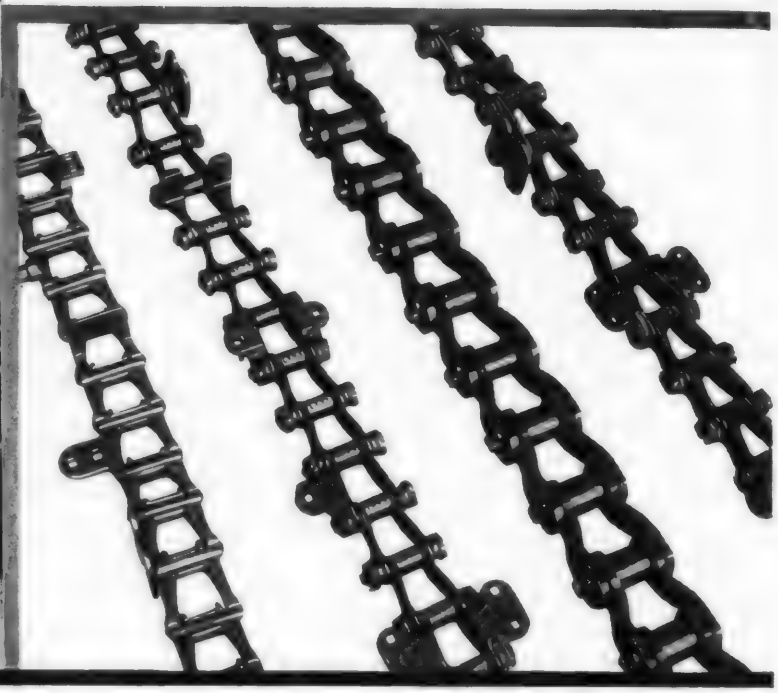

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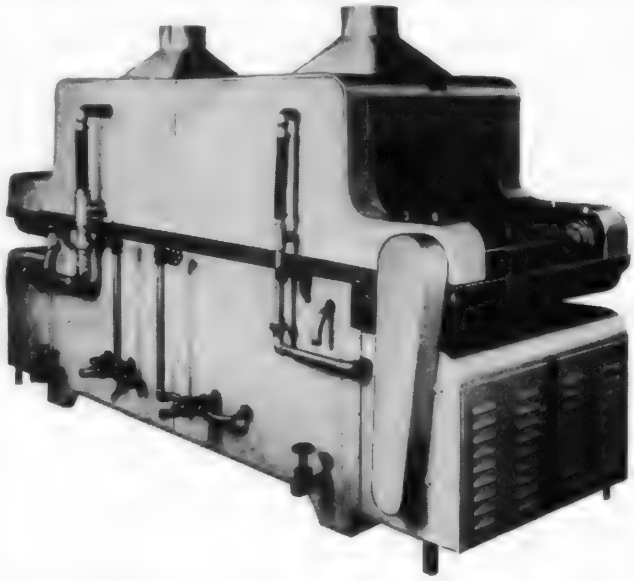

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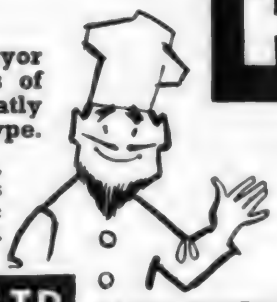

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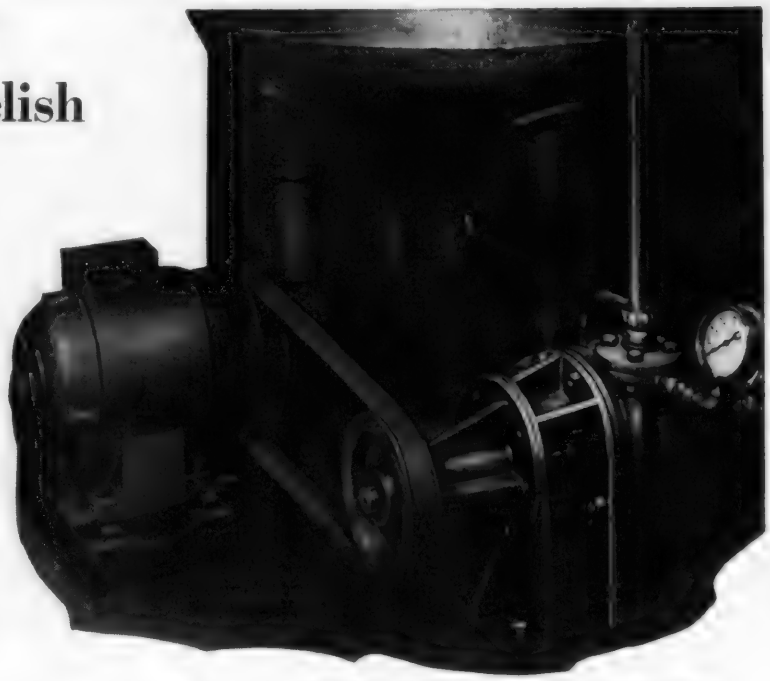

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Number 11 July 1959

Glyceride Selection

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INFORMATION BULLETIN

This advertisement is one of a series of Information Bulletins issued by Loders & Nucoline Ltd. Copies are available, together with a folder, on request to Loders & Nucoline Ltd., Unilever House, London, E C.4.

It is well known that natural oils and fats are mixtures of triglycerides; some are complex and contain many different triglycerides, others are relatively simple and contain only a small number The number of triglycerides found in nature is very large, and this is not surprising when the number of fatty acids found in oils and fats, and the different ways in which these can combine with glycerol to form triglycerides, is considered. The physical nature of an oil or fat is determined by the glyceride mixture involved in each case, i.e. the physical properties of individual glycerides contribute to the nature of the final mixture. Fats which are liquid at ordinary temperatures, i.e. oils, are mainly mixtures of glycerides of fatty acids which are unsaturated, e.g. Oleic and Linoleic acids, etc., but fats solid at ordinary temperatures can contain glycerides of saturated acids, e.g. Lauric, Myristic and Palmitic acids and also mixed glycerides formed from both saturated and unsaturated acids.

The different glycerides found in natural oils and fats vary considerably according to their chemical nature, some are liquid at ordinary temperatures, others melt around blood heat (98°F.) and some have much higher melting points. Many industries use fats in their processes, but often the natural ones are not entirely suitable; for instance, Coconut Oil, a hard fat at temperatures between 55° and 65°F., rapidly softens at temperatures above 70°F. and is completely melted at 76-77°F.; this reduces its usefulness for many purposes. Hydrogenation is useful in raising melting points, but has its limitations, particularly where hard brittle fats resembling physically, the expensive Cocoa Butter, are required as in Confectionery work. The main requirements of these fats are hardness, stability and a short melting range just below blood heat. It has been found that reduction in the number of glycerides in a mixture often leads to a product having desirable properties, particularly when a selection can be made of glycerides closely allied chemically.

The main aim of glyceride selection is to widen the scope of available hard fats, particularly in Confectionery and occasionally in Biscuit manufacture. A technique applied to Coconut and Palm Kernel Oils is to allow the liquid fat to solidify under controlled conditions and submit it to hydraulic pressing, thus separating the fat into stearines (high melting points) and oleines

Stearines from Coconut and Palm Kernel Oils are hard brittle fats with melting points similar to Cocoa Butter, and find a ready use as fats for chocolate coatings and cheaper chocolate. Their properties arise from the small number of similar glycerides present, in which myristo-dilaurin predominates. These stearines, although used considerably as Cocoa Butter substitutes, unfortunately give rise to eutectic effects with more than a trace of Cocoa Butter, and the resultant total fat component of a chocolate product may be too soft for satisfactory results. This is no doubt the result of the chemical differences between the saturated fatty acids of the stearines and those forming the glycerides of Cocoa Butter, partly saturated and partly unsaturated. Cocoa Butter itself is of interest in that it contains a relatively small number of glycerides, of which some are very similar in constitution. Approximately 80% of the glycerides present are mono-oleo di-saturated, and one glyceride, 2 oleo-palmito-stearine, is present to the extent of approximately 50%. To produce a satisfactory Cocoa Butter alternative free from eutectic effects when mixed with Cocoa Butter establishes a need for a more specific selection of glycerides similar in chemical constitution to those present in Cocoa Butter itself.

The old method of graining and pressing is not sufficiently selective for many requirements and new techniques of separation are needed. These are based on fractional crystallisation from suitable solvents and enable a much greater control to be exercised over separation of required glycerides. By this technique one is able to isolate fractions in which a single glyceride will predominate to almost 90%.

LN 54-8058

FOOD MANUFACTURE

Vol. XXXIV, No. 7 July 1, 1959

Printing dispute

THE dispute in the printing trade has compelled us to produce an abbreviated issue. Some articles and features have had to be held over; we apologise to our readers and contributors and beg their forbearance in a situation over which we have no control.

Revolution in milk

THE fifteenth International Dairy Congress opened in London on June 29 and is now in progress. This is the first of such congresses to be held in this country for more than 30 years. In 1928 the position of the dairy industry in this country was serious; the economic depression which reached a climax in the thirties was beginning to make itself felt, and prices paid to primary producers were very low. Since then, the position has undergone a revolution. The establishment of Milk Marketing Boards and the amalgamations that have taken place in the industry have put the production and distribution of milk on a systematic basis, and the introduction of free and cheap milk for priority classes has ensured that no one who needs this nourishing fluid need go without. As is pointed out in our associate journal *Dairy Engineering*, which devotes its July issue to the Congress and to the achievements of the past 30 years, the United Kingdom today is a dairying country in its own right, comparable with the traditional dairying countries of the world, and often taking the lead in the techniques of production, marketing, and distribution. In the U.K. today there are about 167,000 milk farms producing nearly 2,500 million gallons per year. The eradication of bovine tuberculosis has made such progress that large areas are now completely free, and complete eradication from the whole of the U.K. is likely within the next five years. The average yield per cow is between 700 and 750 gal. per annum, which compares favourably with the best dairying countries.

One of the finest achievements of the dairy industry is the daily door-to-door delivery service enjoyed by almost all our 50 million inhabitants, which has quite justifiably been called "the finest food delivery service in the world," and which not even the war disrupted. In this respect we are ahead of any other country in the world, and in this service an important part is played by the electric delivery vehicles which are a familiar sight in our cities. These vehicles are ideal for the short hauls involved in milk rounds, and it is worth noting that British electric trucks are now exported all over the world.

What of the future? Dried milk and milk products are an obvious and logical field for technological study. With rising transport costs and increasing pressure on storage space, it is becoming more and more uneconomic to move and store large quantities of water, and milk is largely made of it. If an "instant" milk powder can be cheaply produced having, on reconstitution, all the advantages of natural milk, this will be a far-reaching achievement, and may well be the answer to the challenge of synthetic or "filled" milk.

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IN his Presidential Address to the annual general meeting of the B.F.M.I.R.A., Professor Frazer said that there are many members of the food industry who do not give adequate support to food research. There are many in the food industry who regard science purely as a means of analytical control and the solving of production problems; worse, there still exist those who do not think much of science at all. Now industry is not a philanthropic institution, and businesses exist to make money; but surely, beyond the day to day problems of earning bread and butter for the workers and jam for the directors, there is room for a little altruism, a thought to spare for the wider issues. In the long run, the wider viewpoint pays dividends, for the fruits of research, although unpredictable, are frequently very rich.

Of the 1,700 or so food firms in this country, only a third are members of the B.F.M.I.R.A. Presumably the other two-thirds do not think it worth their while to subscribe to an organisation which exists for the benefit of its members, although, as taxpayers, they do indirectly contribute, for the Government evidently considers it worth while that public money should be used to assist its work. Although one-third of the food firms are members, this does not mean one-third of the manufacturing capacity, for firms vary enormously in size, and it is probably true that the larger firms, who in many cases have their

own research establishments and who have less need of the services of the Research Association, show more public spirit by supporting the cause of research, whereas the smaller firms, who are the very ones who stand to gain most benefit, tend to keep away. The question of finance can hardly be a deterrent, for full membership of the Association can be had for a paltry £24 per annum, a sum which is probably less than most directors spend on club membership or motor insurance premiums.

The Research Association, as Professor Frazer pointed out, strikes a careful balance between fundamental and applied research. Much of the work undertaken is carried to as fundamental a level as possible, which benefits both science and industry as a whole. In addition, more specific enquiries are carried out of particular interest to perhaps only one section of industry. It is a very good thing that the Association has the possibility of being a link between fundamental work carried out in universities and specialist establishments, and the particular current requirements of industry. If it received more support from industry it would be better able to function as such, for the lasting good of all.

Yesterday's parboiled food

WHAT a gloomy picture Professor Frazer painted of food in Britain a century ago! Listening to his remarks we became quite depressed as the mental image we have long cherished of the sturdy English yeoman sitting down to plain but ample fare in his thatched cottage was systematically and coldbloodedly demolished. ". . . a huge round of parboiled ox flesh, with sodden dumplings floating in a saline, greasy mixture, surrounded by carrots looking red with disgust and turnips pale with dismay . . ." It is enough to make the stomach turn over. Was this the supper which awaited the ploughman as he homeward plodded his weary way? What about the local cheeses which have long been famous, the farmhouse bread, the traditional dishes popular to this day whose origins are lost in the past?

Certainly, standards of hygiene have improved immeasurably since those days, and food is more uniformly pure and wholesome. Knowledge of nutrition which our forbears did not have enables us to eat a more balanced diet; and freezing and preserving techniques and much more rapid transport place at our disposal fruits and delicacies, in season and out of it, which our compatriots a century ago had never heard of. Preserving methods of the past were based on what Dr. Banfield recently described as the "blunderbuss" technique. For lack of knowledge of the fundamental principles of preservation, the food handlers of those days, if they wanted food to keep, had to do the job of smoking, curing, or pickling with a thoroughness which imparted a flavour too strong for our less robust generation.

A complaint which has been voiced before in these columns is the deterioration in flavour of much of today's processed food, and the increasing unawareness of the finer points of good eating on the part of much of our population. Certainly the people are today much better fed than in the past; the malnutrition rife a century ago has now been banished from this country, but we are not subscribers to the view that because our forefathers lacked most of the material things that scientific progress has brought to us who are living now, there was in consequence universal misery. We are not a *laudator temporis acti* who deplores the passing of the "good old days," nor shall we allow the intoxicating wonders and delights of "progress" to erase from our mind the sneaking feeling that our descendants a hundred years hence might see in this present age one or two things to smile at.

Introducing "Fibres and Plastics"

WITH the current (July) issue our associate journal *Fibres International* changes its title to *Fibres and Plastics*.

Sensing the growing need for a reliable source of information on the new industries which employ both fibres and plastics in the manufacture of their products, the Leonard Hill Technical Group is supplying this need with *Fibres and Plastics*. The current issue contains an introductory article on the subject of Fibres-and-Plastics, a full-length contribution by A. J. Hall, B.SC., F.R.I.C., F.T.I., F.S.D.C., entitled "Fibre/Plastics Materials," and "Static—Your Problem"—an article which discusses the problems of static electricity in textile materials, plastic films, and fibres-and-plastics used together. In addition, the fibres-and-plastics aspects of the 1959 International Plastics Exhibition will be featured in a special report.

Fibres and Plastics will, in addition, retain many of its regular features, including "World Fibres News," the popular "Fibres Commentary," "News from the Industries," "Materials and Equipment," and the regular Management Section.

The combinations of fibres and plastics range from plastic-coated textile materials to fibre-resin laminates, and are rapidly forming a new growth industry in its own right. The products of this industry are saving money in countless other industries, and readers of FOOD MANUFACTURE are invited to apply for a free voucher copy of *Fibres and Plastics* to see for themselves just how these new materials can help them in their own fields. Applications should be made to *Fibres and Plastics*, Leonard Hill House, Eden Street, London, N.W.1.

Potato Crisp Production Streamlined

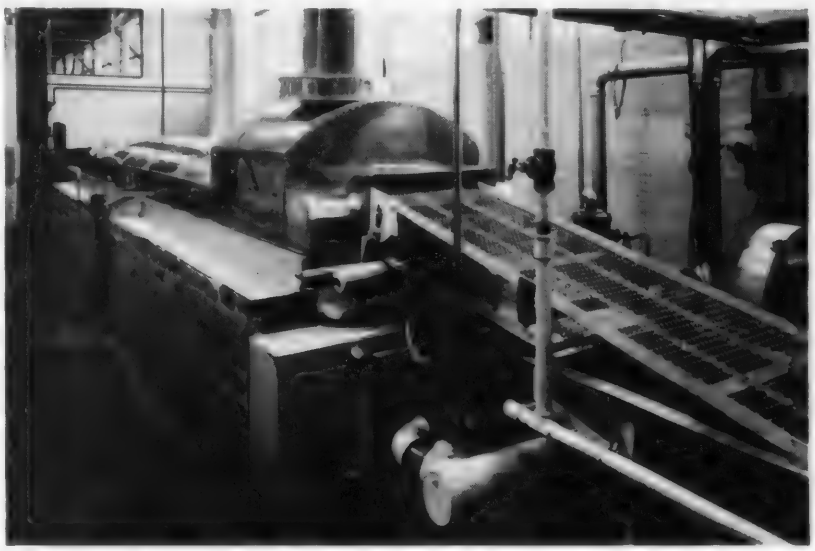
Crimpy Crisps' new automatic cooker now in operation

Automation has been brought to the Winnersh, Berkshire, factory of Crimpy Crisps, Ltd., where potato crisp output has been boosted by the installation of their new cooker. FOOD MANUFACTURE was recently given an exclusive preview of this interesting development.

THE firm of Crimpy Crisps, Ltd., was founded in 1937 by Mr. J. C. Sword, the present chairman, who established a potato crisp factory at Airdrie in Lanarkshire. The building which he took over for this purpose occupied an area of about 70,000 sq. ft., and the crisps were made entirely by hand and cooked in open pans. The business prospered, and in 1938 Mr. Sword bought Lion Potato Crisps, Ltd., which had been established in Manchester in 1929. This factory was destroyed by bombs in 1942, and on its site is now one of the firm's distribution depots. The continuing expansion of the business was checked by the outbreak of war, during which the firm received a Government allocation of groundnut oil which enabled it to carry on until better times came.

After the war, although Government controlled supplies of groundnut oil continued to be used, expansion was possible by the use of free supplies of teaseed oil from China, which, however, was very much more expensive than groundnut oil. In September 1949 the Winnersh factory, formerly a tractor factory, was bought, and this went into potato crisp production in August 1950, using teaseed oil. At the present time, only groundnut oil is used.

The cost of the existing installations at Winnersh amount to about £100,000. The factory comprises not only the plant for making potato crisps, but also a well-equipped engineering shop where all the machinery for both the Airdrie and Winnersh factories is made. Although formerly the firm's machinery was made only for its own use, so successful have been their activities on the plant building side that they are now selling plant to other firms. In the engineering shop we saw under construction a large fully automatic cooker which will be exported to Denmark.



The automatic cooker designed and built by Crimpy Crisps, Ltd., originally for their own use, but now available to other potato crisp manufacturers.

80% of the firm's products are distributed direct to retailers by driver salesmen in its own vehicles, of which it has 70. The largest of these vehicles can carry 3,000 tins of crisps. Besides the three main distribution centres at Airdrie, Manchester and Winnersh, the firm have depots in many of the larger cities.

The Winnersh plant is under the energetic direction of Mr. D. A. Sword, son of the Chairman, who has piloted its operations since its inception in 1949.

New automatic cooker

An instance of the firm's progressive outlook and one reason for their confidence in developing their sales is the success of their new fully-automatic cooker, which is now in operation at Winnersh. This machine has been designed and built at Winnersh, and is a fine example of a machine built for a special purpose yet which has great potentialities. Considerable interest in this machine has been aroused, especially overseas, and as already mentioned, one is being built for Denmark. In the course of the next year or two, all the existing older cookers, which nevertheless are very efficient and which are automatic to a considerable degree, will be replaced by the new type, and the factory's output will be speeded up even more.

(*Left*): **After delivery, sacks of potatoes are elevated to the darkened and temperature-controlled store, one of the compartments of which is seen on the right.** (*Right*): **Potatoes from the store pass from the hopper on the left by bucket elevator through this rotary washer, whence on emerging they fall into the stonecatcher on the right.**

Potato crisps are thin slices of potato cooked in oil to a golden colour. The most desirable kind of potato for crisp manufacture has high starch and low sugar content, because on cooking in oil the sugar tends to caramelise and produce an undesirable dark brown colour. The sugar content of potatoes tends to fall when they are stored under correct conditions, and so, during the winter months, the firm like to use potatoes which have been stored for some time. It is common practice in the winter to store for up to six weeks. At the time of our visit, not many potatoes were in store, however, because a changeover to new potatoes was about to be made, and these must not be stored for more than a day or two. The storage capacity is considerable, and provision is made during the winter time to keep the potatoes at a temperature of 45 to 70°F., depending on the sugar content. The store rooms are kept darkened to prevent rapid sprouting. Winter potatoes have a higher sugar content than summer, and for this reason, crisps made in winter tend to be darker in colour.

Potatoes are normally stored loose in cubicles having slatted wooden sides, and air is circulated through the stacks. We were told that there is no restriction as to the size of potato, although small size is not welcomed because more waste occurs with them.

The firm aim next year to have in operation a scheme whereby farmers will themselves store the potatoes at a temperature of 45 to 50°F., delivering them to Winnersh only as required. By this arrangement, the Winnersh factory will need to store sufficient potatoes for only ten days' output.

On arrival, tests are carried out on the potato consignment to determine the specific gravity of the potatoes and their sugar content. A cooking test is done, and from the information obtained, the optimum processing conditions can be established for that particular consignment.

Processing

From the potato store to the packing of the finished product, the material in process travels continuously and automatically through the various operations by mechanical conveyors, and very little handwork is necessary. Each production line has a maximum capacity of about 4½ tons per hour.

The potatoes, after being tipped by hand into a hopper, are taken by elevator to a rotating horizontal slotted drum, where they are sprayed with water to remove dirt and foreign matter. On emerging from the rotary drum, they fall into a tank of brine whose specific gravity is so adjusted that they float. Stones fall to the bottom of the tank. This stonecatcher is very necessary, for in the height of the potato lifting season the vegetables contain much stony matter. Next, the potatoes pass by elevator to a peeling machine, consisting of rotating carborundum stones, and then by means of a bucket elevator to an automatic slicing machine.

The slices pass along a wire mesh conveyor to a spray washer, where the surface starch and small waste pieces are removed, and then to the automatic cooking machine.

The older type of cookers use gas for fuel, but the new automatic machine can use gas, oil, or a combination of both. It is monitored by a Negretti and Zambra recording controller, which automatically controls the cooking temperature by regulating the burners and the time of cooking. The burners are protected by flame failure equipment; the flame is observed by a photoelectric cell, and if a burner goes out, the fuel supply is automatically cut off.

Cooking times and temperatures vary according to the type of pota-

(*Left*): **Part of the cookhouse of Crimpy Crisps, Ltd., showing on the right the new automatic cooker (potato slices are being fed into it by a conveyor) and on the left, one of the older type cookers. The difference in size of the two machines is noteworthy; although smaller, the new machine has the higher output.** (*Right*): **Crisps emerging from the automatic cooker.**

toes and the season. In winter, times of 2 to 2½ minutes are normal, and in summer, 1¼ to 1¾ minutes are sufficient. At high throughputs, cooking temperatures are in the region of 380°F., and at low throughputs, 320°F. The new cooker is designed for an output of 850 lb. crisps per hr.

Groundnut oil is stored in a 4,000 gal. storage tank, whence it is piped to the cookhouse and fed to the cookers as required. Oil is recirculated rapidly through the cooker, a heat exchanger enabling the waste heat of the outgoing gases to be taken up by the incoming oil, so conserving fuel.

The recirculating pump is a Sigmund centrifugal type pump. Most of the machinery at Winnersh, incidentally, is driven by Newman motors through David Brown gearboxes.

The oil taken up by the crisps in their passage through each cooker, when working at full capacity, amounts to about 250 gal. per hour, and this quantity of fresh oil is drawn off automatically from the supply to the cooker. At the end of the day, recirculated oil is drained from the cookers and stored in a 400 gal. storage tank to be used again.

Careful check is kept on the quality of the cooked crisps. As they pass along the cooling conveyors to the packing section, they are scrutinised and defective crisps are removed. The potato slices entering the cooker, too, are frequently checked for thickness with a micrometer gauge. Overall enforcement of quality standards is the responsibility of the control laboratory chemist.

A Hansella machine which fills nuts into Cellophane bags.

Packing

From the cooker a series of conveyors, which also serve the purpose of allowing the cooked crisps to cool, take the crisps to the packing room. A number of different packs are used, including cartons of several sizes, and tins. The bags are filled by means of *Hy-Tra-Lec* machines made by Industrial Products (Speco), Ltd. A battery of these machines are mounted on either side of the conveyor bringing the crisps from the cookhouse. From the conveyor the crisps are lifted by bucket elevator to a dividing head which divides the line of crisps into a number of streams, each feeding one machine. Each machine delivers a weighed amount of crisps into a glassine bag, which as it is filled drops away on to a bag conveyor which takes it to a *Rotoplex* sealing machine, for sealing of the top. This machine is made by Strachan & Henshaw, Ltd., of Bristol. Not forgotten is the tiny bag of salt in blue waxed paper which is inserted into each bag.

Other products

Besides plain potato crisps, Crimpy Crisps, Ltd., also make a tomato flavoured crisp pack known as *Bar-B-Q*, several varieties of roasted nuts, nuts and fruit, and a biscuit and cheese sandwich

(*Left*): **Cooked and cooled crisps from the cookhouse being examined visually before being conveyed to the filling machines.** (*Right*): **A battery of " Hy-Tra-Lec " filling machines which fill the potato crisps into transparent bags. The crisps pass to the machines from the overhead conveyor.**

pack. *Bar-B-Q* crisps are made by the incorporation into the crisps of a specially prepared powder, containing 22 ingredients, in rotating drums. The filling of nut products into cellophane bags is carried out with machines made in Holland by Hansella N.V. These ingenious machines operate by the feeding of two continuous strips of cellophane to either side of a metal tube; a sealing mechanism seals the edges of the two strips to form a continuous sleeve round the tube. As the tube travels downwards, it is sealed laterally to form a bag closed at the bottom. At the same time a measured quantity of nuts is injected down the tube into the bag, and simultaneously with the next downward movement of the cellophane sleeve, the next lateral sealing action forms the top seal of the filled bag and the bottom seal of the next bag coming up, and cuts the filled and sealed bag full of nuts so that it drops away.

Tin washing

Returned empty tins are washed by means of a washing machine made by Robert Kellie and Son, Ltd., which operates in a fashion similar to that of a bottle washing machine, and which can handle 15,000 tins per day.

To obviate gradually the use of these returnable tins, which are not cheap, crisps are now being packed in polythene bags in expendable cartons.

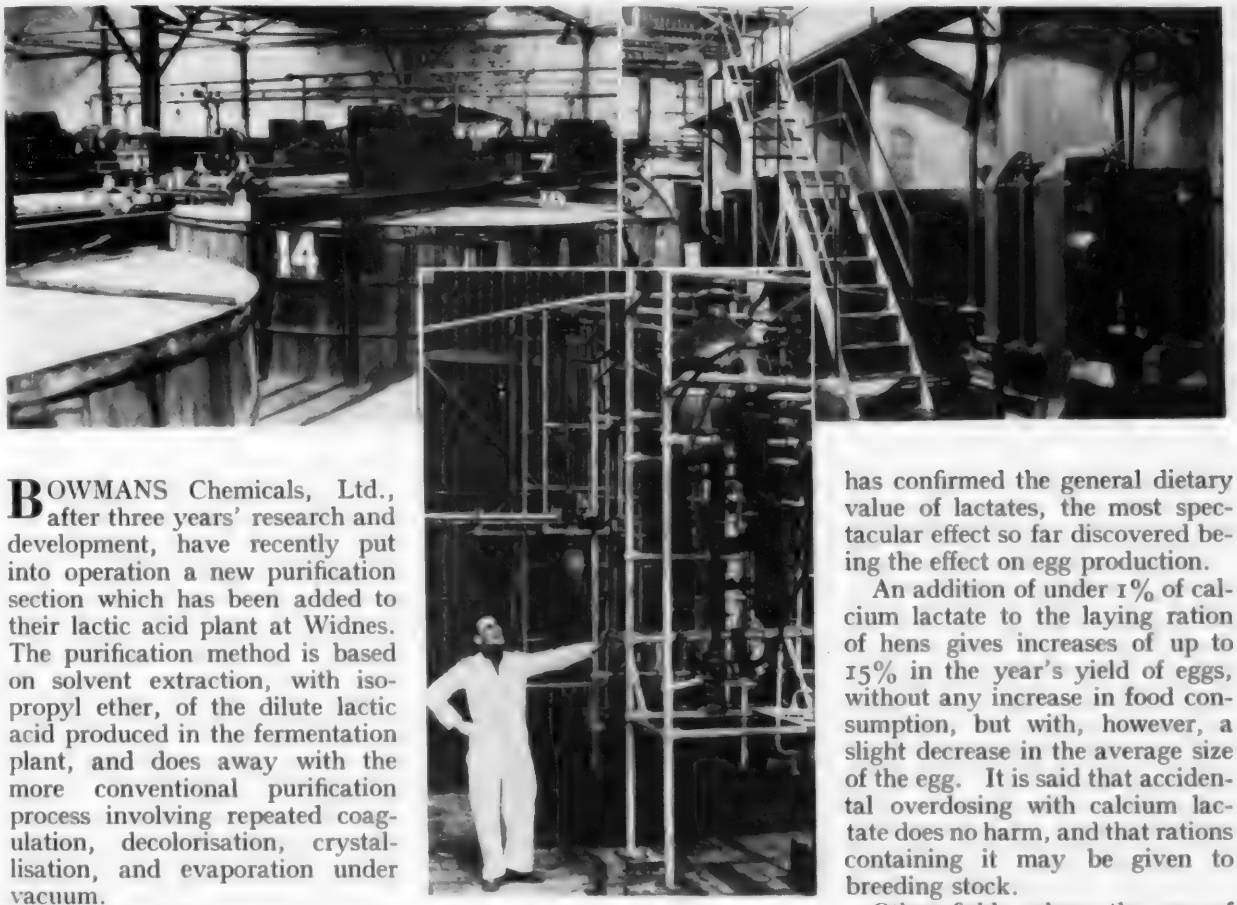
Crimpy Crisps, Ltd., have reason to be proud of their achievements in this highly competitive field; in particular, in the nine years of its productive existence the Winnersh factory has forged ahead at a pace which shows no signs of slackening. As one approaches the trim factory building with its white concrete and blue paintwork, one's impression is that this is what a food factory ought to look like, and the external appearance is a true guide to the interior, for inside one finds an orderly layout of plant and equipment and an atmosphere of spaciousness and cleanliness.

(*Left*): **Returned empty crisp tins being washed in a Robert Kellie washing machine.** (*Right*): **A " Rotoplex " sealing machine which heat-seals the bags of crisps after filling.**

New Lactic Acid Process may extend Use in Food

Purification method believed to be unique

FOOD MANUFACTURE was recently shown the lactic acid plant of Bowmans Chemicals, Ltd., at Widnes, where a new purification method, based on solvent extraction, may cut costs and extend its use in human and animal food.



(Top, left): **Some of the fermentation vats in which lactic acid is formed from sugar.** *(Top, right):* **The solution after fermentation is boiled with lime and acidified in these pans.** *(Centre):* **Part of the new extraction plant, in which glass pipes and vessels are extensively used.**

BOWMANS Chemicals, Ltd., after three years' research and development, have recently put into operation a new purification section which has been added to their lactic acid plant at Widnes. The purification method is based on solvent extraction, with isopropyl ether, of the dilute lactic acid produced in the fermentation plant, and does away with the more conventional purification process involving repeated coagulation, decolorisation, crystallisation, and evaporation under vacuum.

Lactic acid is extremely corrosive to metals and alloys, and the new plant is constructed almost entirely of glass, supplied by Quickfit and Quartz, Ltd., at a cost of something under £25,000. Bowmans hope that the introduction of this improved purification process will make available cheaper and more abundant supplies of lactic acid and lead to an extension of its use in the food industry.

Use in foods

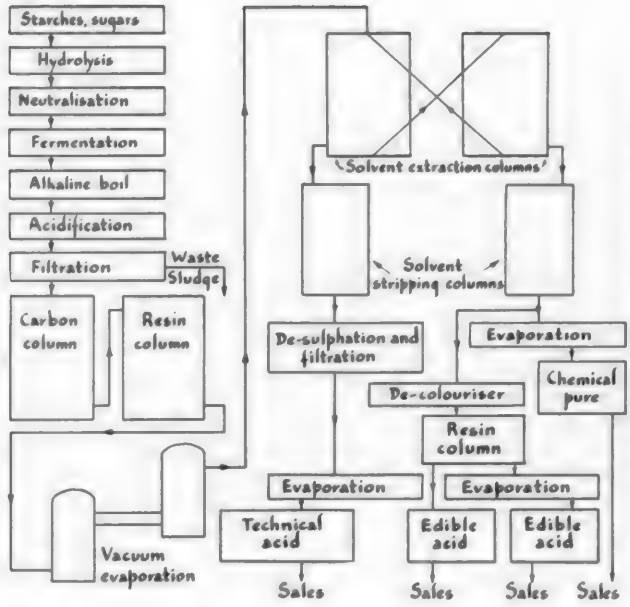
Lactic acid occurs naturally in many foods, and takes part in normal animal metabolism. It is useful where a smooth and bland acid flavour is required, such as sugar confectionery, soft drinks, pickles and sauces, and brewing. For many years it has been believed that lactic acid is a factor in the absorption of calcium into the body; recent work, both by Bowmans and by the Nutritional Research Institute at Huntingdon, has confirmed the general dietary value of lactates, the most spectacular effect so far discovered being the effect on egg production.

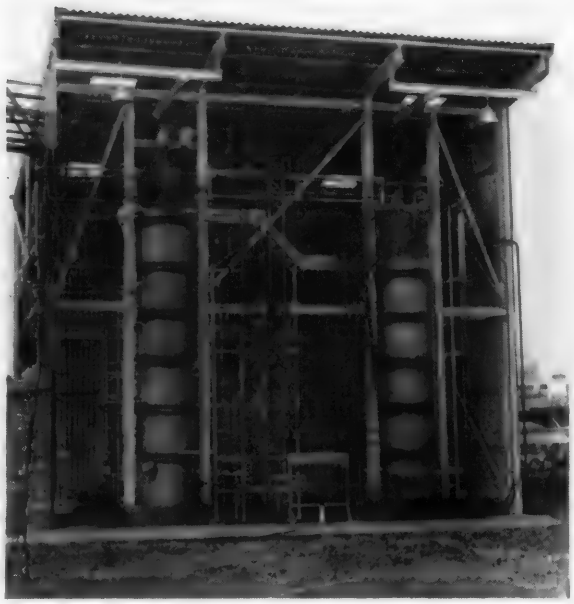
An addition of under 1% of calcium lactate to the laying ration of hens gives increases of up to 15% in the year's yield of eggs, without any increase in food consumption, but with, however, a slight decrease in the average size of the egg. It is said that accidental overdosing with calcium lactate does no harm, and that rations containing it may be given to breeding stock.

Other fields where the use of calcium lactate appears to show promise are pig feeding and the fattening of beef cattle. A somewhat different application is its use for the prevention and cure of cattle acetonæmia and twin-lamb disease.

Manufacture of lactic acid

Lactic acid is produced by the anærobic fermentation of sugar. After hydrolysis with sulphuric acid and neutralisation of the excess acid with lime, the sugar solution is transferred to wooden fermenting vats, inoculated with a culture of lactic acid producing





(*Left*): **A diagram showing the process of lactic acid manufacture and purification.** (*Right*): **The new solvent extraction section which has been added to the lactic acid plant.**

bacteria and allowed to ferment for 5 days at 50°C. The fermented material is boiled with lime, acidified with sulphuric acid, which liberates acid, and the precipitated calcium sulphate is filtered off.

The dilute lactic acid solution is decolorised in activated carbon columns which are regenerated in sequence, a process which is believed to be entirely new. The decolorised solution is freed from residual calcium, amino-acids, and traces of heavy metals by percolation through ion-exchange resin, and then evaporated under vacuum to a concentration of 90%. The concentrate is then extracted in counter-current with isopropyl ether; the enriched solvent is re-extracted in counter-current with distilled water, and the stripped solvent, containing about 1% water, is recirculated to the extraction tower. The pure aqueous lactic acid extract is given a final decolorisation and ion-exchange treatment, and is then ready for sale or for further evaporation to the strongest grade.

The whole process was devised and the plant designed under the direction of the technical manager, Mr. C. G. Childs, M.SC., A.R.I.C.

Pure Food and Drugs in America

IN the U.S.A., many people took part in the fight to ensure that today, when the American housewife picks up items from the shelves of supermarkets and walks out again, she does so with confidence that the foods are accurately labelled and that the contents of cans and packages are pure.

Outstanding among the people responsible for this state of affairs in America was Harvey W. Wiley, chief of the Department of Agriculture's Bureau of Chemistry. Of the many concerned in the struggle to pass the Pure Food and Drugs Act of 1906, it is stated* that no one individual deserves more acclaim than he. His lifelong work began in the 1870s and continued right through to his death in 1930. He fought against the padding of coffee with chicory and the indiscriminate use of chemical preservatives, he deplored the adulteration of drugs with ineffective fillers and the mass sale of useless or dangerous patent drugs.

His battles with vested interests, his ups and downs, his fight over the use of saccharin as a cheap substitute for sugar, together make a story worthy of this era of progress in U.S. history, and his crusade leaves the stamp of an uncompromising and upright man.—S. W. M.

* *The Health of a Nation*. By Oscar E. Anderson, Jr. Pp. 333. London: Cambridge University Press. 45s.

Packaging

THE eleventh edition of the Packaging Annual has a new layout which is designed to make the book easier to use and more informative than previously. It comprises a Directory of Addresses; a Buyer's Guide, which is divided into four parts: Materials and Supplies (including Closures), Containers, Machinery and Equipment, and Services; a Directory of Trade Names; and an index to advertisers. Nicely produced on glossy paper, it forms a useful and comprehensive guide to suppliers of packaging materials, equipment, and services.

* *Packaging Annual*, 1958. The Tudor Press, Ltd., London. 1958. Pp. 214. 17s. 6d. net.

The D.S.I.R. research trawler "Sir William Hardy."

Problems and Trends in the Fish Industry—I

By C. L. Cutting,* B.Sc., Ph.D., F.R.I.C.

Is the British Fish Industry at the cross-roads? How will it measure up to the growing elusiveness of its raw material and increasing consumer demand for higher quality? In this informative and stimulating article the author shows that there is a lot the industry can do to put its house in order, especially in the fields of cold storage and distribution.

THE British fishing industry is showing signs of entering into a phase of more rapid development in which it is possible that radical changes may occur. If fish is to withstand competition from foodstuffs produced under more rationalised conditions, the industry may well have to change its traditional methods and attitude. Britain is one of the major fishing nations amongst the larger industrialised countries, but even so the total weekly purchase of fish only amounts to 6 oz. per head as compared with nearly 3 lb. of meat. Fish consumption varies amongst individuals much more than that of any other major protein foodstuff. It could probably drop right out of the diet of many people without causing them much concern.[1] Properly preserved and presented, however, fish is an unrivalled delicacy. If it were always available in consistently good condition consumption might be stimulated more than by any advertising campaign. However, the task of producing uniformly good fish demands greater attention by the industry to the conditions of handling from catching to retailing.

The fish trade has two inherent difficulties to contend with. Firstly, it is based on the hunting, at the mercy of wind and water, of a wild stock. It is therefore much more difficult to plan production than it is in the case of agriculture. Secondly, the situation is aggravated by the fact that fish is the most rapidly perishable of all animal protein foodstuffs. This is because fish, being cold-blooded creatures, carry a natural marine bacterial flora that is adapted to sea-water temperature. Fish bacteria are thus able to thrive and cause spoilage at much lower temperatures than those of mammalian meat, for example, which can be brought chilled from the Argentine and distributed in Britain some six weeks later, whereas fish kept for little more than two weeks in ice is putrid.

These two factors, lack of control over supplies from day to day and rapid spoilage, combine to make it difficult for fish processors to arrange for a steady throughput of fish of consistently good quality. Prices at first sale, too, fluctuate violently in response to the variation in day-to-day supply and demand.

As a result, the fish industry in the last hundred years has developed on:

1. the use of ice to cool the fish and thus retard the depredations of spoilage bacteria;

2. speed in handling at the port and in transit to consuming areas;

* Officer-in-Charge, Humber Laboratory, D.S.I.R., Hull.

3. a rough-and-ready, but nevertheless quite discriminating, method of quality assessment based almost entirely on rapid subjective assessment of external appearance.

Since World War 1, technological problems, to some extent, have been the cause of chronic economic difficulties in the fish industry, and successive Governments have set up committees to examine the position. The present Government appointed in 1957 a new committee under the chairmanship of Sir Alexander Fleck "to assess in relation to the development of fishing and the marketing of fish, the size, pattern and implications of an economic fishing industry in the United Kingdom, and to report." Its recommendations, which are not expected for some time, will be awaited with interest by everyone associated with the fish trade. Recently Iceland, which depends largely on its native fishing industry, has extended its territorial waters, which has presented the British fishing industry with further difficulties.

Government research stations

Torry Research Station was established in Aberdeen under the Department of Scientific and Industrial Research in 1929 following an enquiry in 1927[2], to help solve problems in keeping the quality of fish reaching the consumer as high as possible. By 1939, when the war disorganised its activities, useful progress had been made in a number of practical fields related, amongst others, to chilling, freezing and smoking, as well as in establishing a considerable body of background data on the properties and composition of fish. Since 1946 it has continued and extended its front, built new laboratories, launched a unique research fishing vessel and, in order to improve contact with the industry, opened a new sub-station at Hull, on the Humber, which together with Grimsby constitutes the economic centre of the British fish trade. The expenditure planned for last year was about £150,000[3].

Several other Government departments are concerned with fish. The Ministry of Agriculture, Fisheries and Food is responsible for Government administration in England and also maintains a marine biological research laboratory at Lowestoft, with shellfish stations at Burnham-on-Crouch and Conway. The Scottish Home Department plays a similar role in Scotland with a research laboratory, also in Aberdeen, and a salmon and trout station at Pitlochry. Further Government money is allocated from the Development Fund chiefly to biological research by independent institutions at Plymouth, Millport, Windermere, etc. Each of these three official bodies spent in 1957-58 about £300,000 on research[4].

The White Fish Authority and Herring Industry Board are bodies responsible to the Ministries for development and for grants and loans for new vessels and equipment. The Board of Trade, Ministry of Transport and other Ministries also exercise functions affecting fish.

The present article attempts to analyse the position of the fish industry, its problems, the improvements that are called for, and possible future trends, solely from the standpoint of a Government research worker in the technology of preserving fish for food.

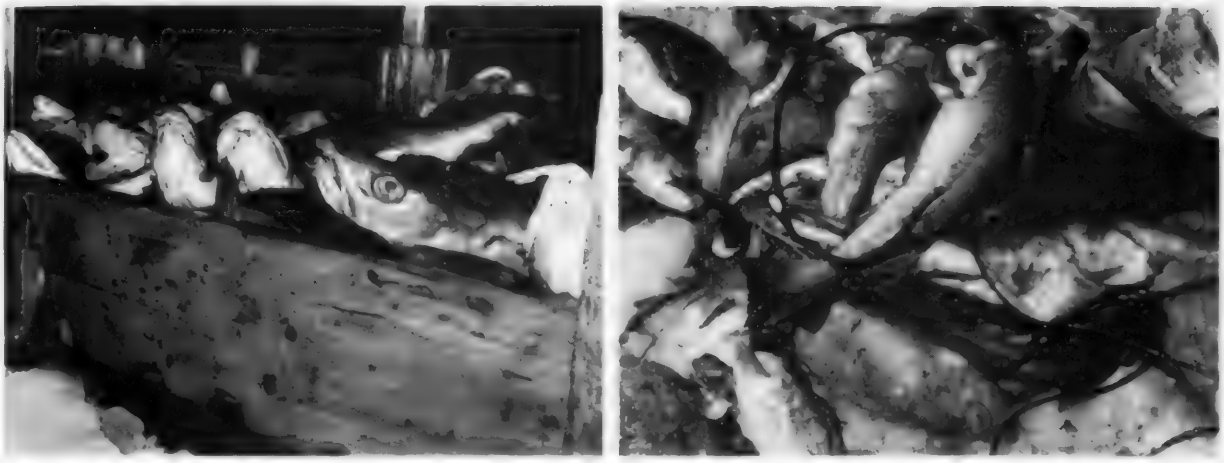
Quality depends on fishermen's skill

The fish bacteria responsible for spoilage, although psychrophilic (*i.e.* "cold-loving") have an optimum growth rate at about 60°F. At 40°F., deterioration is $2\frac{1}{2}$ times as rapid as it is at 32°F., whilst at 50°F. the factor is $5\frac{1}{2}$[5]. Every degree F. lowering has a correspondingly greater effect as one approaches the freezing point, 30·2°F. for fish of normal salinity.[6]

As the greater part of the distribution time of most fish is spent on the fishing vessel, it is imperative to maintain the lowest possible temperature, short of causing freezing. To apply this properly on sea (or on land) presents special problems. On board the trawlers, which land most of our white fish (cod, haddock, plaice, etc.), the fish when properly mixed with crushed ice assumes a temperature of between 30° and 31°F. (There is a slight cryoscopic effect resulting presumably from traces of salt.) About 50% of our white fish comes from fishing grounds off the coasts of Iceland, Norway, Russia, Spitzbergen and Greenland. The average time taken to return from these grounds is 5 days and the round trip is usually about 20 to 21 days, although 25 days is not uncommon in winter. An average landing therefore consists of fish varying from 5 to 15 days in ice. Only if the first-caught fish is well cleaned and properly iced will it still be fit for human consumption at the end of the trip. This fact dictates the schedule of operation and puts a premium on speedy return to port. In spite of this urgency, Port Health Authorities at Hull and Grimsby, the chief distant water ports, condemn on average some 1% or so of the landings, and a further 5% is left unsold at the normal auctions for various other reasons, such as the minimum price structure, although poor quality is also a factor. Although operations afloat are not easy at the best of times, on the whole the standard of handling of distant caught fish has to be good, or it would not survive the journey. Nevertheless, it is noticeable that there is considerable variation in performance from ship to ship, no doubt related chiefly to the skill of the skipper and crew. It may be presumed that this skill could be passed on by suitable training. A few years ago it was estimated that between 5 and 10% of the distant water landings would, with still more attention, be capable of an improvement in freshness equivalent to between 3 and 6 days' storage life in ice[7].

Ice storage problems

Some of the later fish caught is usually not buried in ice in bulk, but is laid out on a bed of ice on shelves, one fish deep, with no ice on top. Contact with ice, etc., produces superficial bleaching, due presumably to the contraction of pigment cells. The appearance of



(*Left*): **Fish aboard ship on fish-room shelves after removal of top ice.** (*Right*): **Fish aboard ship at a later stage than on left showing leads from distant-reading thermometers for measuring temperature changes during the voyage.**

"shelved" fish is therefore more attractive than that of "bulked", although it is debatable how far along the distribution chain the difference continues to be discernable. However, owing to the fact that the temperature of "shelved" fish on the ship is often a few critical degrees higher, it is beginning to be recognised by the producer that in relation to number of days in ice this may be at times less fresh than it would be if it were completely surrounded with ice. Ordinary bulking in 3 feet layers of fish and crushed ice on the other hand definitely marks the fish with indentations, and causes shrinkage and loss of weight[8]. "Shallow bulking" would produce a better result with no more labour than "shelving" as practised at present. Packing iced fish in boxes at sea also results in good retention of quality, but involves more work and requires considerable space for stowage of empties, etc. Insulation of fishrooms and installation of refrigeration plants, whilst generally advantageous, can give no better results than adequate ice properly applied. In any case, the heat production *in situ* resulting from bacterial respiration in staleing fish is comparable with the heat leaking through the ship's side[9].

A machine for gutting fish and mechanical means of facilitating the icing are probable developments which future ships may have to accommodate. Advantages have recently been claimed by Canadian research workers for stowage at sea in refrigerated seawater as an alternative to ice. If the experiments now being carried out in this country indicate that this system gives better or even as good results as usual British practice, there will be repercussions on methods of ship construction as well as of stowing and unloading.

On North Sea trawlers the fish has not been dead for so long on landing, but gutting and icing are not always so thorough as on distant-water vessels. On some seine net and inshore vessels, ice is not always used and fish that should be the freshest on the market deteriorates most rapidly in consequence[10].

Better distribution needed

Herring are mostly caught close to land on overnight trips, but they cannot be gutted at sea and therefore soon begin to decompose in summertime, particularly when stowed in bulk. It is becoming commoner to pack herring in boxes at sea to reduce damage to the fish, but icing at sea is still exceptional on British drifters, partly because iced fish is held to be unsuitable for certain types of processing, such as salting and "redding."

Once the fish arrives at the port it has to be unloaded. The present procedure is largely manual, very laborious and relatively costly. It could no doubt be rationalised by suitable materials-handling equipment, although stowage methods, too, might need modification to obtain the fullest advantage. However, any such mechanical methods must not be liable to damage fish by bruising.

(*To be continued*)

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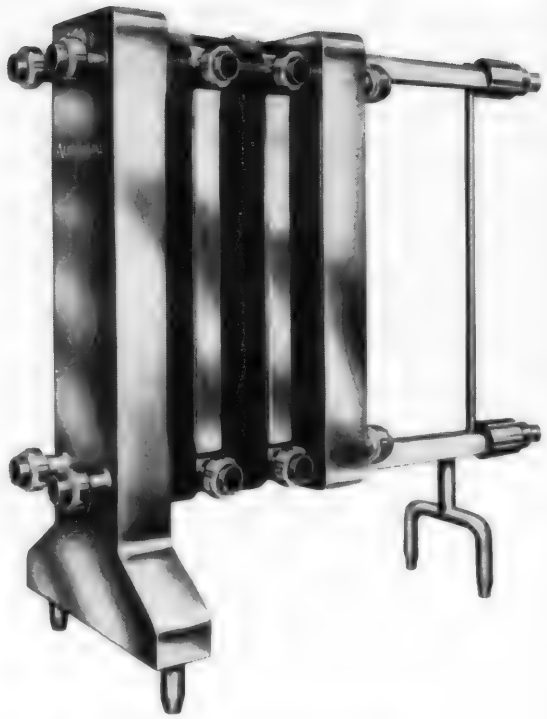
HEAT EXCHANGERS AND REFRIGERATING PLANT



Efficient heat exchange is a vital factor in processing. In this FOOD MANUFACTURE survey, various types of equipment are reviewed.

MOST industrial processes involve the transfer of large quantities of heat at different points; the fluids concerned have therefore to be heated and subsequently cooled, or *vice versa*, and liquids evaporated and condensed. For reasons of operating economy, some form of heat exchange must be employed. The types used vary greatly according to the function and requirements of the process, and a broad selection are described in this article. The question of refrigeration, too, is an important one where food processing is concerned, and this has its own special problems.

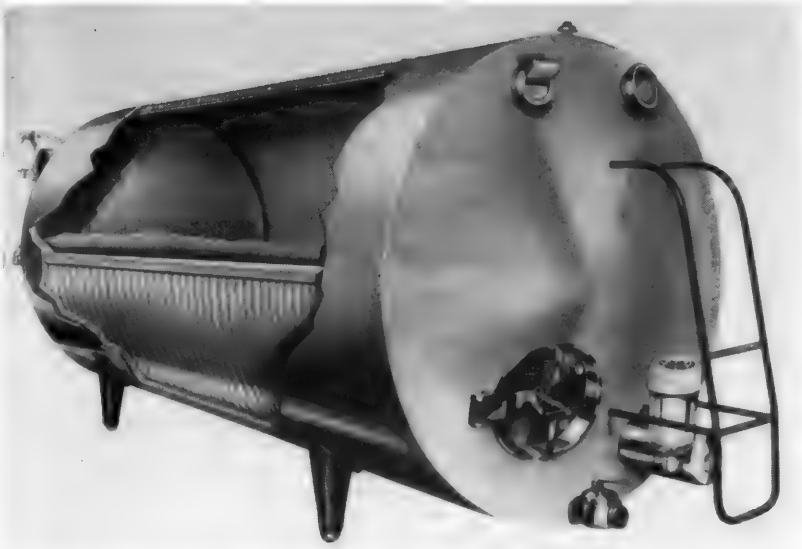
Plate heat exchangers

Alfa-Laval Co., Ltd., offer a wide range of plate type heat exchangers which are of especial interest to the food, beverage, and chemical industries. These heat exchangers are scientifically designed with corrugated plates which divide the liquids or gases into thin layers and a high heat transfer coefficient is consequently achieved. It is claimed that these heat exchangers may not only be chemically cleaned and sterilised on site, but also may be completely dismantled very easily, points of great importance where food is concerned.

(*Above*): **The De Laval type P. 14 heat exchanger with frame and carrier bars for easy cleaning.** (*Below*): **The De Laval type VB bracket-mounted heat exchanger.**

De Laval heat exchangers are normally offered with all liquid contact parts of stainless steel construction. Other metals such as cupro nickel, titanium, etc., can also be used for the plates when circumstances demand.

Two basic types of frames are available. Firstly, the normal frame which incorporates twin tightening devices and end plate which may readily be slackened back for easy accessibility to all the plates. This frame is available in stove enamel finish or in stainless steel clad finish. The second type of frame is simpler and cheaper. In this case the tightening is effected by a number of external bolts, and this type of frame is satisfactory when opening for cleaning is not frequently required.



The A.P.V. "Heil" refrigerated tank, showing how the corrugated evaporators cover the lower part of the tank within the insulated casing. A liquid ammonia refrigerant accumulator is mounted at the rear of the tank and is connected by piping to the evaporators.

The De Laval plate heat exchangers are built up individually with specific plate arrangements for the particular duty. By using suitable connecting plates several different heating or cooling duties can be effected in the same unit. A typical example is, for instance, in their use as pasteurisers, when the following sections can be used on the same frame: (*a*) initial regenerative heating of ingoing liquid by hot outgoing liquid; (*b*) final steam heating; (*c*) holding at pasteurising temperature; (*d*) initial cooling of pasteurised liquor in section (*a*); and (*e*) final cooling of pasteurised liquid with water, chilled water, or brine.

Intermixing of the liquids in the different spaces between the plates is claimed to be quite impossible due to a special system of gasketing.

Typical applications of De Laval plate heat exchangers include the following: cooling of wort, beer and sugar solutions, pasteurisation of beer, cooling of yeast creams, heating and cooling gelatine liquors, heating, cooling, and pasteurising fruit juices, soft drinks, etc., and heat recovery from effluents.

The object of the A.P.V. Co., Ltd., in introducing the *Paraflow* plate heat exchanger in 1923, was to make available for the first time a highly efficient continuous heat transfer unit, with surfaces which were easily accessible for cleaning and equally easily replaceable. Since then, it is claimed, these features have contributed to the *Paraflow's* acceptance as standard equipment in many sections of the food and beverage industries, where heating, cooling, sterilisation, and pasteurisation of processed liquids must be carried out under hygienic conditions. The flexibility of the *Paraflow* is claimed to be particularly valuable, for not only can its capacity be varied to meet changing needs, but it may combine a number of separate stages or duties within one frame such as simultaneous heating, cooling, and regeneration.

This heat exchanger consists of any required number of suspended stainless steel plates, clamped between a head and follower and sealed at their outer edges by fixed rubber gaskets. These gaskets are so arranged around the ports that a thin film of each liquid flows, usually in counter current, through alternate plate spacings. Corrugated troughs in the plates greatly increase the heat transfer area and cause a high degree of turbulence, increasing the efficiency of heat exchange.

The plates are grouped to operate in parallel and so provide a "pass" sufficient for the required rate of flow. The liquids are brought out to ports with connections which can be British Standard R.J.T., A.P.V. type "S.P.," or American 3A.

From a basic range of standard frames, utilising four sizes of plates, *Paraflows* can be made up to meet almost any requirement and for capacities up to about 40,000 gal. per hr. on straight cooling.

The A.P.V. Heil all-welded stainless steel tanks incorporate the Heil flooded refrigeration system for the cooling of milk, cream, ice cream mix, and other liquid food products while in storage. The special construction allows liquid refrigerant to be applied direct to the tank wall and the large area so covered provides the most effective heat extraction and the highest efficiency of refrigeration.

Clarke-Built, Ltd., offer a range of plate heat exchange equipment in stainless steel for high temperature short time pasteurisation of milk, heating, cooling, and regeneration. The basic unit is the heat transfer plate, which has embossings or knobs on its surface between which the product is squeezed in a wide but thin film. Hermetically bonded gaskets provide leak protection and eliminate risks of the liquids mingling. All plates are said to be readily accessible for inspection, and cleaning, and removal of individual plates is simply a matter of sliding them off the guide rails, without having to dismantle the press. It is claimed that the positioning of inlet and outlet ports and connections permits the utmost flexibility in pipeline arrangements and plant layout.

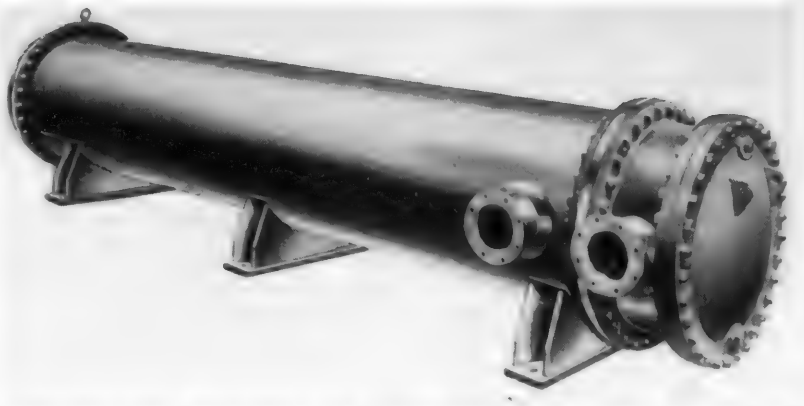
The latest Clarke-Built heat exchange equipment covers full H.T.S.T. pasteurisation from 100 g.p.h. to 2,200 g.p.h., these capacities being catered for by two models. The small duty, type SD, range is 100-300 g.p.h., whilst the high duty, type HD,

model covers a range of 400-2,200 g.p.h. In addition there is a neat and streamlined general duty model, invaluable for the dairy which requires straight cooling or heating. The type GD can also be supplied for a double duty such as heating and cooling or two-stage cooling.

Continuous rotary processing

The Clarke-Built *Rota-Pro* is a rotary, scraped-surface heat exchanger in which, it is claimed, even the most viscous liquids, and those containing a high proportion of undissolved solids, can be efficiently processed well above their normal boiling points or below o°C. The process is continuous, through a closed, mechanically controlled system, and the working principle is that of bringing a small body of product into contact with a large heat transfer surface, which is continuously scraped, thereby exposing the surface to the passage of the untreated product.

Rota-Pro thus ensures rapid and efficient heat transfer. Both heating and cooling of the product can be carried out separately or together as required. The *Rota-Pro* system, being continuous, saves time and labour. Product quality is kept uniform, to a predetermined and controllable degree. Floor space requirements are at a minimum. Each *Rota-Pro* machine is specially built to the technical and chemical needs of the product-processing duty specified.

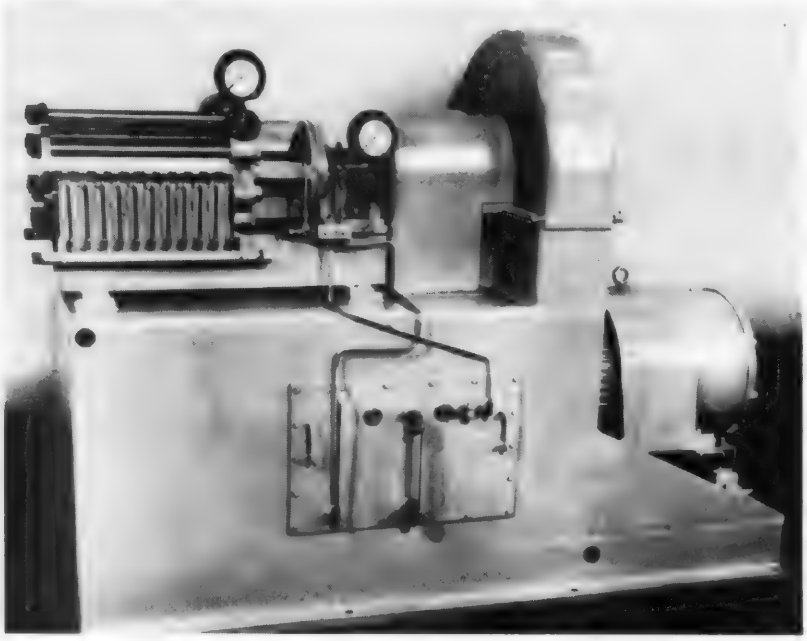


A multi-pass sugar liquor heater, one of a range made by Holden and Brooke, Ltd.

Shell and tube heat exchangers

Exchangers of the shell and tube type, of which Holden and Brooke, Ltd., make a comprehensive range, are among the most commonly used.

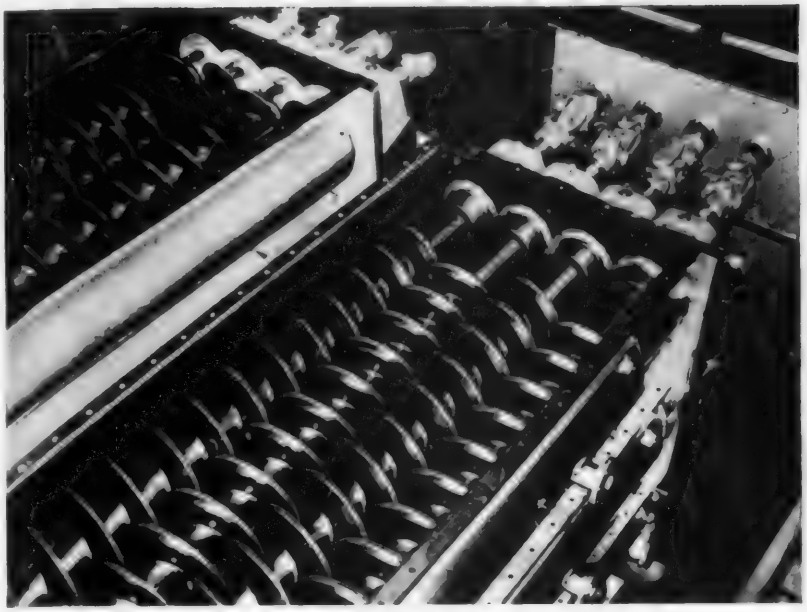
Holden and Brooke's experience dates back many years, and they say they are well acquainted with the problems that the industry encounters. The type of exchanger which they can offer varies between the small water/water coolers to the very large type of multi-pass sugar liquor heaters. Either a fixed or floating header tube bundle can be incorporated, and this is generally dependent upon the operating conditions. In addition to the fact that virtually any of the special metals normally used by the food industry can be incorporated in this class of exchanger, it is possible to offer bi-metal tubes, which is particularly important where there is the risk of contamination or erosion on either the shell or the tube side of a particular unit. Considerable attention has also been paid to the question of leakage from one side of the exchanger to the other, and it is claimed that the designs offered entirely preclude this possibility.



The Baker Perkins Flowmaster reactor in which heat may be transferred to or from material being mixed and blended.

Condensers

Condensers made by S. Briggs and Co., Ltd., are manufactured from a wide range of metals, including cast iron, mild steel, stainless steel, monel, inconel, copper, aluminium, etc., dependent on the nature of the process. Linings such as tinning, galvanising, metal spraying, thermo-setting plastic and glass, often provide economical protection for the cheaper metals. The headers or end boxes have several divisions to ensure high velocity of the vapour or



The Holo-Flite processor, made by Holdan Engineers (London), Ltd. Hollow intermeshing syncro-screws transport and heat or cool the material being processed.

liquid through the tubes, thereby increasing the efficiency of heat transmission. The tubes may be either expanded into the tube plates, or if desired, may be fitted with ferrules at one or both ends. To facilitate inspection and cleaning, and easy withdrawal and replacement of tubes, hinged doors are fitted on the headers or boxes. A branch is provided to facilitate the removal of sludge, etc., from the interior of the condenser. Condensers with cooling surfaces from 25 to 1,000 sq. ft. are available as standard sizes, and other sizes to suit customers' special requirements can be supplied.

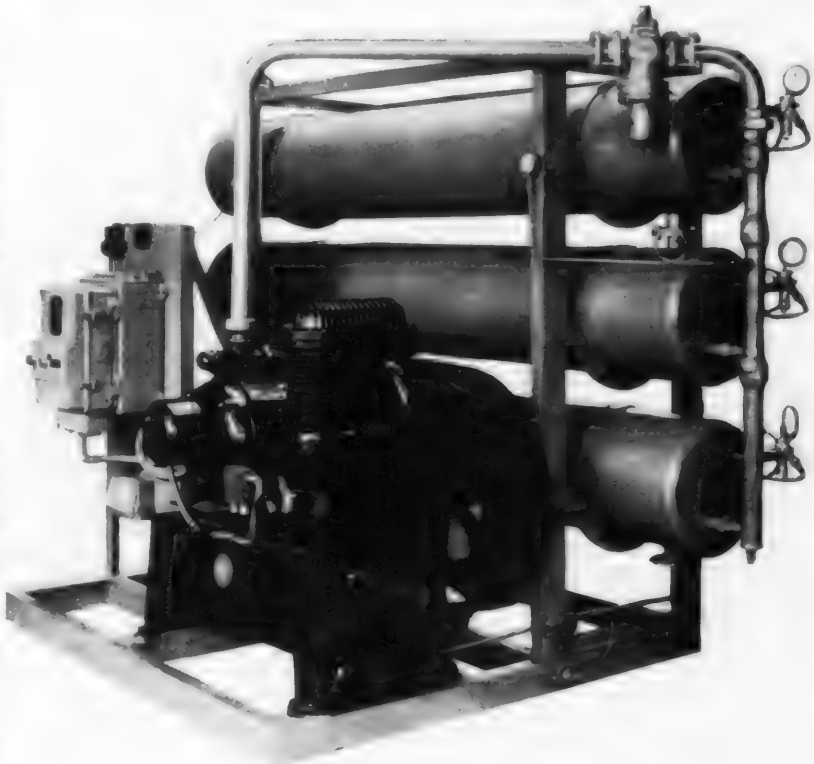
Continuous processing

The *Flowmaster Reactor*, made by Baker Perkins, Ltd., is a continuous processing machine which is essentially a continuous mixing and blending unit for fluids, waxes, and light doughs designed in such a way that whilst mixing or blending heat may also be transferred to or from the material being processed. The reactor consists of a series of fixed heat transfer plates through which a heat transfer fluid, *i.e.* brine, water, steam heat transfer oil, Dowtherm, etc., may be circulated. Spaced between each heat transfer plate are beaters mounted on a common shaft. These beaters intensively mix in a relatively small volume the material flowing through the channels of each heat transfer plate. Besides intensively mixing the incoming material, it is claimed that the degree of turbulence creates a thin film giving much higher heat transfer coefficients than obtainable with conventional equipment, and owing to the heat transfer plates being effectively scraped by the beaters there is little chance for a degrading film of material to be formed in the machine.

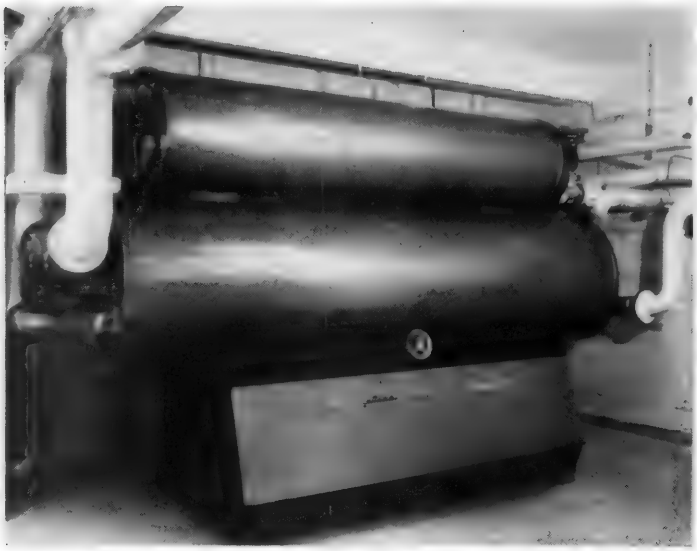
Due to the unit construction of the *Flowmaster Reactor* an extremely wide range of capacities are available, and a reactor can be built to suit each individual requirement.

Basically three standard size heat transfer plates are available, of 7 in., 11 in., and 18 in. diameter, whilst larger sizes are being considered. In addition where processing or other factors indicate the need, 2, 3, or more reactor assemblies may be mounted on one base frame and driven if required by one motor.

The *Holo-Flite* processor, mar-



A 3-cyl. Crystal cooler, made by T. Giusti and Son, Ltd., coupled to a 15 h.p. compressor.



(*Left*): **The automatic absorption refrigerating machine made by the Carrier Engineering Co., Ltd.** (*Right*): **The sausage cooler and drier made by J. and E. Hall, Ltd.**

keted by Holdan Engineers (London), Ltd., is a continuous heat exchanger in which the product to be treated is heated, cooled, or dried at a continuous rate. The *Holo-Flite* screws are designed to churn gently the product so that the heat exchange is uniform throughout the mass: the heat exchange surfaces are right in the middle of the product mass where they are most efficient; it is claimed that there are no hot or cold spots, no encrustation or partial drying, and no vessels to be cleaned, filled, and emptied. This processor has been specifically designed for the continuous processing of powders and granular materials. It will also handle pastes, filter cake, sludges, and slurries. The design incorporates two important patented features. Firstly, screws are arranged in pairs, one right and one left hand, and intermeshed. This promotes churning of the product and the consequent improved heat exchange coefficient. Secondly, the screw design ensures that particle degradation and dusting are substantially eliminated. These features are patented.

The makers say that the principal processes are the cooling of flour and sugar, and that a number of *Holo-Flite* installations are cooling flour at rates between 1,620 and 11,000 lb. per hr. and over temperature ranges such as 180°F. to 70°F., and 100°F. to 0°F. Sugar is cooled in a large number of such installations at 2,400 to 40,000 lb. per hr. and from 120°F. to 80°F. Applications include cooling prior to storage, bulk transport, packaging, and mixing for further processes. Other food products successfully handled include cocoa mix, cocoa press cake and chocolate powder, soya bean meal and soya flour, starch, crushed hog fat, baby food slurries, and various cereals, fruits, and vegetables.

As a continuous processor, the makers say that the *Holo-Flite* unit is compact, economical of floor space, and adaptable to plant layout. When the product must be conveyed as well as processed it does both in one unit, which need be no larger than a conventional conveyor.

Cooling and refrigerating equipment

Among the equipment made by T. Giusti and Son, Ltd., are stainless steel syrup coolers, *Crystal* coolers for bottling water cooling, the *Easiclean* range of surface coolers, *Pastomix* multi-process vessels, and *Coldwell* cold storage vats. The syrup coolers vary in capacity from 25 to 100 gal. per hr., based on chilled water at 35°F. flowing at 3½ times the rate of syrup, although the capacity varies in accordance with the temperature range. Cooling is by chilled water circulation in a shell baffled for maximum efficiency; the cork insulation of the shell is covered by a mild steel casing. The *Crystal* coolers are fully automatic in operation, and comprise single or multi-cylinder coolers, which are available in a variety of materials, coupled to a refrigerating compressor. Each cylinder has a capacity of 50,000 BTU's per hr. designed for direct expansion of Arcton or Methyl at 30°F.; the refrigerant circulates through tubes in the cylinder over which water flows.

The *Easiclean* standard range of surface coolers operates on the well proved, two-stage principle. The standard models are made to cool from 25 to 200 gal. per hr. from temperatures of 200°F., 145°F., or 95°F. down to 40°F. Water at 60°F., or below, circulates to cool the first stage. The second stage is cooled by direct expansion of methyl chloride or Freon 12 (Arcton 6), evaporating at 30°F.: or by brine or chilled water. They are constructed of tinned copper with all joints smoothly flooded with pure tin,

Roll-formed light alloy evaporator units and shelving for commercial and domestic refrigerators, made by Marston Excelsior, Ltd.

presenting a clean, crevice-free surface. Hinged sterilising covers of light alloy give full protection to the contact surfaces and are instantly opened for inspection or for cleaning. In the open position all parts of the cooler are accessible without the danger of damage to the covers. The hinges of the covers allow speedy removal if desired. Stainless steel coolers are made to standard specifications and to special requirements. All parts of these coolers in contact with the cooled liquid are of stainless steel. For technological reasons the headers are made of tinned brass; but the liquid is channelled to flow only over the stainless steel. The grade of stainless steel may be selected to suit the liquid to be cooled.

Pastomix multi-process vessels are designed to mix, heat, emulsify, cool, and cold store all in one vessel liquids such as milk, ice cream mix, cream, synthetic cream, etc. Rapid heating is by steam, gas, or electricity. Precooling is by circulating water, and final cooling by refrigeration. Where no circulating water is available, special models with chilled water reservoirs are supplied.

The Giusti *Coldwell* cold storage vat is designed to keep perishable liquids in first-class condition. They say that years of careful research have produced the highly efficient direct expansion refrigeration and heat insulation which are claimed to be outstanding features of these vats. The result is extremely low power consumption and very close temperature control.

A machine designed and developed to cool large volumes of water down to a minimum temperature of 40°F., using low pressure steam or high pressure hot water (225°F. minimum) as an energy source, is marketed for such applications as air conditioning, process cooling, and water conservation by the Carrier Engineering Co., Ltd. Other applications include increasing capacity of existing refrigerating plant by passing clean chilled water through condensers. It is essentially a static machine having three small pumps as its only moving parts integral with the unit. Automatic control is effected through thermostatic adjustment of condenser water. It is claimed to be compact in size, relatively light in weight, quiet in operation, vibrationless, and to require very little attention and maintenance. There are 13 machines in the range, with capacities from 40 to 700 tons refrigeration, with steam consumption of 20 lb./hr./ton.

Surface evaporators

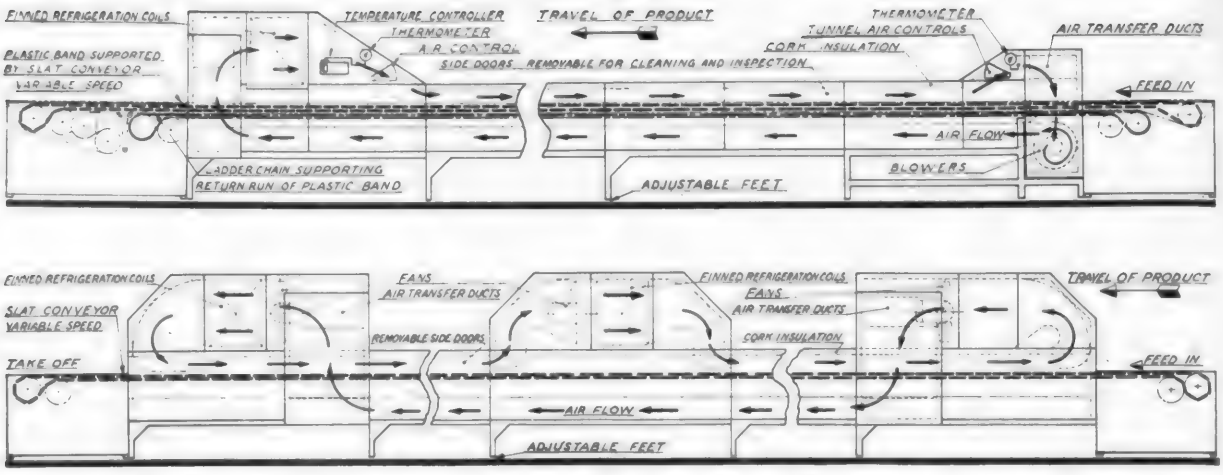
Marston Excelsior, Ltd., a subsidiary company of the Metals Division of Imperial Chemical Industries, say they are specialists in heat exchanger design and manufacture for a wide range of industries. Both secondary and primary surface heat exchangers are made in aluminium, titanium, other non-ferrous metals, and stainless steel.

Among the company's products for the food industry are roll formed light alloy evaporator units and shelving for commercial and domestic refrigerators. The compartments are made from roll bonded heat transfer sheet, in which the tubeways are integral with the sheet. This makes for excellent heat transfer characteristics. The tube pattern is preplanned to concentrate cooling in the areas desired. In cases where connection is to be made to copper, brass, or steel systems the units are provided with flash-butt welded copper/aluminium attachment tubes which are sheathed in P.V.C.

This type of evaporator, in addition to being completely leak proof, is said to offer better heat transfer and is less costly than units made by the traditional methods involving seam welding together pairs of pressed sheets or attaching coils of tube to the outside of the containers.

Cooling tunnels

Walden cooling tunnels, made by Walter Denis Contacts Co., Ltd., are manufactured to meet a variety of applications such as chocolate cooling, wax setting, jelly setting, wafer biscuit cream setting, etc. They are constructed throughout in steel, the insulated casing air transfer ducts and removable side panels being made up of cork insulation cased in steel. It is usual for the air circulation to run contrary to the direction of the product flow, although if desired it can be arranged to run with the product. The cooling of the air is obtained by passing the air through finned evaporator coils except when very low tem-



(*Above*): **The "Walden" medium duty cooling tunnel.** (*Below*): **The "Walden" heavy duty two-stage cooling tunnel.**

peratures are required, in which case embossed refrigerator plates are used. *Walden* tunnels are built also with staged cooling using axial flow fans and two or more banks of finned coils. Another variation is centrally applied cooling in which cold air enters the conveyor section at the centre and travels in both directions down the length.

In the case of chocolate tunnels, it is usual for a tinned iron slat conveyor to be used, carrying on top of it a plastic-faced canvas band or an embossed paper band. The return of the canvas or paper band is carried on a creeper chain conveyor to save wear on the canvas or paper bands. The drive unit for these conveyors is, of course, variable speed, and incorporates a pair of driving drums for a separate drive to the canvas or paper bands. In other cooling applications the slat conveyor only is necessary, or again, only a canvas band conveyor may be required.

The makers say that the advantage of a *Walden* cooling conveyor tunnel is provided wherever continuous cooling can be employed in place of cooling rooms, and other methods of batch cooling. They cut down the amount of handling required, in addition to the increased production that can be achieved. They also claim that these tunnels can be easily and speedily installed on site after being assembled at the works.

Ice maker

In many processes ice is used extensively, and in most cases is required in the crushed or flake form. Until recently, ice had usually been manufactured in block form, making necessary subsequent crushing.

The ice produced by the *Hallmark* flake ice maker, made by J. and E. Hall, Ltd., is in small flakes, which are light in weight, super-cooled, and dry, suitable for packing around easily damaged produce such as fish, meat, and poultry.

The ice making machine comprises essentially a refrigerated annulus, the interior surface of which is swept by a rotating scraper arm. A smooth uniform flow of water passes over this refrigerated surface and is turned to ice, the scraper then removing it in flake form to a storage bin beneath. This bin can be refrigerated if necessary, depending upon the required storage life of the ice. These machines are available to produce from ½ ton up to 12 tons per 24 hours.

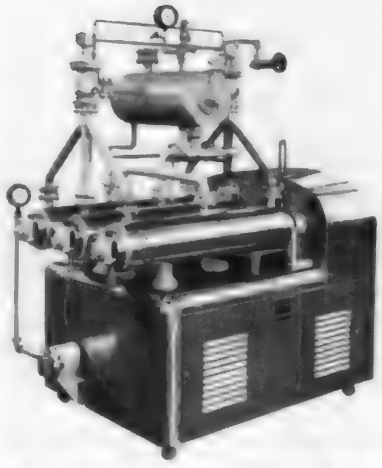
The *Votator* scraped surface heat exchanger, made by A. Johnson and Co. (London), Ltd., has applications in the food industry where it is necessary to heat, cool, mix, and aerate viscous products or where a change from liquid to solid state occurs. Following are some typical applications. It is claimed that *Votator* heat exchangers have long been used in the margarine and fats field. In the case of margarine, the premixed warm emulsion is pumped through an ammonia jacketed *Vo-*

"Walden" refrigerated forced air circulated cooling tunnels, made by Walter Denis Contacts Co., Ltd., installed in a biscuit factory.

tator heat exchanger where it is quickly chilled and passed to a holding section where crystallisation is completed. The margarine is then fed directly through an air-loaded buffer to, normally, two moulding and wrapping machines. A new design gives a desirable open textured margarine, and makes the manufacture of high melting point pastry margarines possible on this type of equipment. Straight edible fats, such as shortenings and lard, can be aerated, chilled, and plasticised in special purpose *Votator* equipment designed to give the product maximum plasticity and creaming power.

Ice cream can be aerated and chilled in an ammonia jacketed *Votator* equipment to produce a very firm and low temperature product. In the field of starch-based products, which includes such products as soups, pie fillings, lemon curd, liquorice pastes, salad creams, starch jelly sweets, etc., a premix is heated under pressure to a controlled temperature, which may be between 220 and 290°F., depending on solids content and degree of gelatinisation required. It will then normally be cooled below flash point, or if a gel is not required probably to room temperature.

A special spiral shaft apparatus is made for gelatinising starch slurries containing up to 40% unmodified starch. Marshmallow and similar products can be aerated, whipped, and simultaneously cooled on equipment designed specially for this purpose. Other applications are the pasteurising of process cheese and the tempering of chocolate, which can be carried out by quick cooling in a water jacketed unit. Chilling of sweetened condensed milk in this heat exchanger is claimed to give a product which does not age, thicken, and discolour, and which has small uniform crystals.



The Johnson Votator processing unit for continuous slush-freezing of concentrated fruit juices uses ammonia cooling.

A new small cooling tower

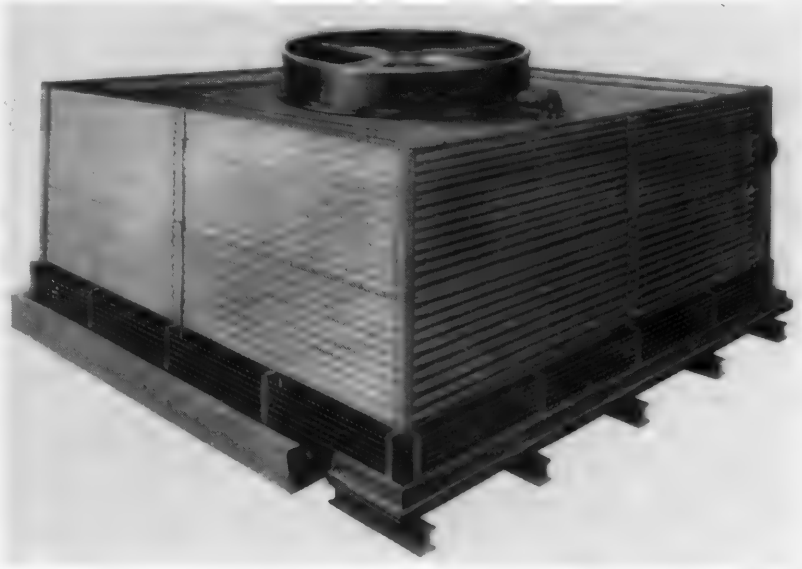
A recent addition to the already wide range of cooling equipment supplied by Head Wrightson Processes, Ltd., is the Fluor series 3 cooling tower, which is made to the same standards of quality, performance, and appearance as on the Head Wrightson-Fluor *Counterflo* cooling towers. They have been specially designed for refrigeration, air-conditioning, and small industrial services.

Design features include totally enclosed, non-corrosive distribution system using wood stave pipes banded with stainless steel and plastic nozzles, nailless packing of interlocking battens for maximum air-water contact, fans with direct or gear drive for continuous service, two pass drift eliminators effecting positive detrainment of water from exit air, removable louvres on all sides assuring smooth air flow and easy access to basin, and prefabrication for speed and ease of erection.

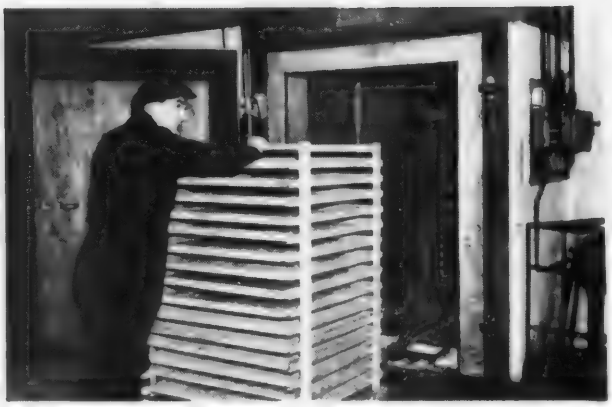
The design of series 3 towers is based on the *Counterflo* principle. The water to be cooled is sprayed uniformly over the packing and is repeatedly broken up as it falls towards the basin; air is drawn in at the bottom through louvres on all sides and sweeps upward in contact with the water for the whole depth of the packing, the driest air contacting the coldest water.

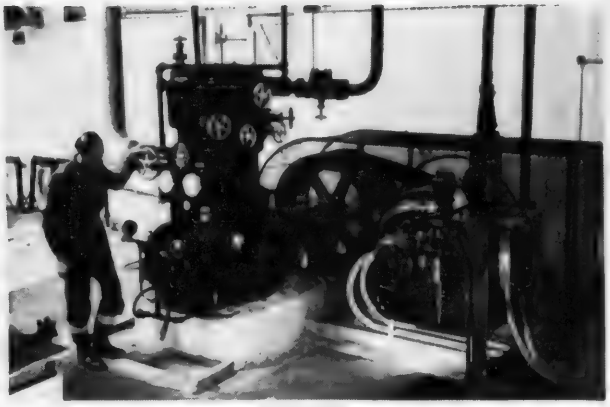
The low height and clean lines of the series 3 towers, together with their light weight, make them suitable for mounting on buildings, where they allow a sympathetic architectural treatment, or in other restricted sites.

The makers say that by the use of *Poly Grid*, the new Head Wrightson-Fluor plastic packing, the efficiency of series 3 towers may be raised even further. This packing is moulded in polystyrene or polyethylene, making it virtually non-corrosive, thus making it suitable for handling corrosive and difficult waters.



This Fluor series 3 cooling tower is a recent addition to the wide range of cooling equipment made by Head Wrightson Processes, Ltd.





(*Left*): **The loading of a six-truck quick freezing tunnel at Smedley's, Ltd., Wisbech.** (*Right*): **The high stage compressor for the quick freezing plant at the same factory.**

Equipment for the Quick Frozen Food Industry

By Ivor C. Ridd,* M.Inst.R.

This article considers the changes in refrigeration design caused by an ever-increasing demand for high quality frozen foods.

IN 1958 the quick-frozen food industry had a turnover of around £26,000,000, and estimates indicate that it may well exceed £33,000,000 in 1959. Over the past few years business has been increasing at the rate of nearly 50% per annum, and it is estimated that the number of packs produced annually is now in the region of 330,000,000, while retailers of quick-frozen foods in the United Kingdom number more than 50,000. This development has taken place since 1946, and it is further estimated that if it continues at the present rate, a quarter of the food shops of Great Britain will very soon be selling quick-frozen foods.

This revolution in the food industry started when a scientist called Clarence Birdseye ate fish and caribou while on an expedition to the Arctic. This had been left in the open and had frozen very rapidly in the intense cold with the result that it had retained its freshness and taste. Experiments showed Birdseye that the retention of the qualities of this food was entirely due to the rapidity of freezing.

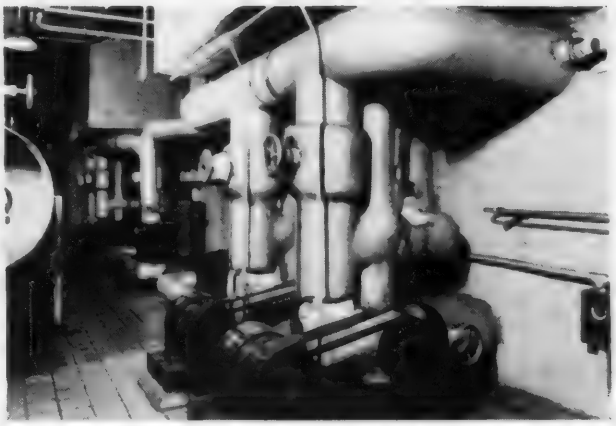
If food is frozen slowly the cell walls are damaged by the large ice crystals formed and its quality is impaired on thawing. In the quick-freezing process, the ice crystals formed are only very small and so the cells remain intact. It is this factor, coupled with the necessary requirement that only top quality produce must be used, that has largely contributed towards the tremendous demand that has been created, while the consideration of convenience, especially to busy people living alone who can buy a complete meal on their way home at night, must not be overlooked. Hotels and catering establishments benefit considerably since the problems of estimating perishable food stocks need no longer exist.

Lower temperatures needed

Quick-freezing demands much lower temperatures than were formerly required, and lower temperatures have presented the manufacturers of refrigeration equipment with problems of plant selection and design. Where former requirements could be met by plant using single stage compression, today a more complicated plant using two or more stages of compression has to be selected.

The reasons for this are as follows. Until quick-freezing became an accepted practice, temperatures in cold stores were generally in the range of 10 to 20°F. This required the refrigeration plant to operate at an evaporation temperature of 0 to −20°F., which, using ammonia, the popular refrigerant of the day, could be achieved with single stage plants. Quick-frozen foods, however, must be frozen and stored at lower temperatures. These temperatures are determined by the required storage life; in general it can be said that the lower the storage temperature the longer the life of the product, although in practice other factors must be considered, to eliminate every possibility of deterioration during storage. These factors would range from grade of product to methods

* York Shipley, Ltd.



(Left): **Three York 15 in. × 10 in. booster compressors installed at the "Frood" factory of J. Lyons and Co., Ltd.**
(Right): **Liquid ammonia recirculating pumps serving the air blast freezing tunnels at the "Frood" factory.**

of stacking in the cold store and would include strict quality control throughout the entire process. Temperatures are lower, therefore, for short season produce where enough has to be quick-frozen and stored during, say, a six week season, as for peas, to meet demands for a whole year.

The storage temperatures for quick-frozen foods, depending once again on the product, vary between 0 and −20°F. Long term shortage usually requires a cold store designed to provide storage temperatures of −10 to −20°F. while its refrigeration plant must be designed to operate at temperatures of about −30°F. The freezing plant generally works at an even lower temperature, freezing the product to −20 to −30°F. and requiring evaporating temperatures at the refrigerating plant of −40 to −50°F.

To achieve these temperatures it is necessary to design for multi-stage operation. This is dictated by the effect of pressure and temperature which is imposed on the plant by the characteristics of the refrigerant. Most reciprocating compressors are designed to operate at maximum compression ratios of 9 or 10:1, while rotary compressors are lower than this. The system compression ratio increases with the lowering of evaporating temperature which is dictated by the demands of the product. As the compression increases it should be noted that among other things the superheat temperature increases and when the design limits are reached it becomes necessary to split the plant into stages, thereby lowering the compression ratio to acceptable limits in each stage. The characteristics of the available refrigerants vary, but in general it may be said that with those currently popular multi-staging must be considered below evaporating temperatures of −20°F.

Equipment

The main types of freezing equipment in current use are the multi-plate contact freezer and the air blast freezer. In the former the product is interleaved between plates containing the low temperature refrigerant. This close contact between product and plate gives a high rate of heat extraction and therefore a rapid freezing time. Provided only one thickness of pack is used between each pair of plates the multi-plate freezer will handle any thickness of pack. Pressure contact is made by a hydraulic ram and is automatically maintained throughout the freezing period.

Where irregularity of the physical dimensions of the product to

A typical refrigerated vehicle for transporting frozen foods. Refrigeration is provided by a condensing unit housed in a ventilated compartment at the rear, operated by an external electricity supply when the vehicle is stationary.

be frozen makes it impossible to use the contact plate freezer as, for example, pre-packed poultry, the air blast equipment is installed. This directs cold air on to the products as they are conveyed through the freezing tunnel or chamber. This equipment is particularly suitable for liquids, bakery products, poultry, complete meals, etc., and ice cream.

Both types of freezer form the evaporators of two-stage systems, usually utilising ammonia as the refrigerant. The balance of the plant would comprise either a low stage compressor of rotary or reciprocating design working in conjunction with a high stage reciprocating compressor, or a compound machine housing a high pressure and low pressure cylinder arrangement to give the appropriate stages. In either compressor system, superheat is removed between stages by liquid injection or in an intercooler. Condensers can either be of the evaporative type or shell and tube. Evaporative condensers have the added attraction that they make small demands on the water supplies, requiring only to make good losses from evaporation.

Storage

The factors governing the size of storage rooms are the output and the type of product. With a short season product, naturally, greater storage capacity is required if all-year-round demands are to be met.

The equipment used in the cold store will once again be of the multi-stage type because of the temperatures required. Cooling may be effected either by air-blast coolers of one of the many types available or by ceiling and wall pipe grids. Savings in first costs are possible with the air blast coolers, but operatives may experience discomfort if care is not taken in the design of the very low temperature air distribution system. A particular advantage with this type of cooler is that it is very adaptable to automatic control, having a low refrigerant charge compared with the pipe grid systems.

The balance of the refrigeration plant will be similar to that described previously for freezing.

Refrigerated transport

After freezing and storing, the product must be transported to distributive depots in suitable vehicles. Where long distances are involved, refrigerating units are installed either for direct drive from the lorry engine, powered by a separate engine drive, or simply arranged for electric motor operation from an external power supply when the vehicle is stationary. The evaporators employed may be of the forced draught design, or eutectic hold-over plates. With rail transport, containers are normally loaded at depots for road collection, and it is only possible to arrange for external coupling of refrigerating units. In these cases hold-over plates are usually employed; it is also possible to pack the products with solid carbon dioxide, a suitable refrigerant.

Depot storage units would be similar to those already described, while for local deliveries to the retailers small vans in which hold-over plates are employed or in which the products would be packed around with solid carbon dioxide would be adequate.

Scientific and Industrial Instrument Guide

THE latest 600-page illustrated scientific and industrial instrumentation handbook,* has been described by Sir David Eccles, President of the Board of Trade, as a book vital to every branch of industry.

The directory has a four-language scientific instrumentation glossary in French, German, Spanish, and English which increases its range of utility. It covers scientific and industrial instrumentation for research and production in the following main fields: Measurement and control of temperature, pressure, humidity, flow, weight, texture, dimensions: inspection and gauge testing, manual and automatic: data processing, computers: optics, ophthalmics, navigation, meteorology, microscopy, astronomy, surveying and levelling: physics, mechanics, pneumatics, hydraulics and electrics: analysis: laboratory ware: atomics, electronics and nucleonics.

The chief sections in the directory are: associations allied to the instrument industry; British Standards Specifications; consultants, engineers for instrumentation schemes; manufacturers of prototypes and small batches; instruments and components with manufacturers; glossary in French, German, Spanish and English; addresses of manufacturers and their overseas agents; selected trade names and manufacturers announcements.

* *British Instruments: Directory and Buyers' Guide, 1959.* United Science Press, Ltd., in association with Scientific Instrument Manufacturers' Association of Great Britain. £2 2s. net.

Composition of Fish

THE object behind this report* is to provide a suitable work of reference for investigation in the fields of nutrition, food science and technology, and comparative and general biochemistry. Although fish plays such an important part in the feeding of mankind and in the production of various animal feedingstuffs, together with a number of miscellaneous industrial products, it is only in the last half century that the fish has merited systematic investigation of its chemical composition, and now the authors of the present work have tried to assemble as comprehensive a body of valid data as possible within their scope.

The mineral composition of fishes in general are given and 52 pages are devoted to the composition of the different organs of fish.

* *The Chemical Composition of Fish Tissues.* By R. M. Love, J. A. Lovern and N. R. Jones. London: H.M.S.O. 4s.

Machinery and Equipment

DRUM OPENING TOOL

A tool designed to remove heads from steel drums, which, it is said, it does quickly and cleanly even in the case of heavy gauge material is now being made by Powell and Co.

The makers point out that an important safety feature is that a clean cut without dangerous, ragged edges is made close to the inside edge of the drum. The special cutter blade is drop forged and heat treated and is detachable for occasional sharpening or replacement.

FLOW METERING

Improved flow and liquid level metering accuracies as a result of installing a new high-performance diaphragm on their differential converter transmitters are claimed by Honeywell Controls, Ltd.

The " pneumatic balance " differential converter, which previously contained a Fluon-coated diaphragm separating high and low pressure chambers, now uses *Viton* as a diaphragm coating.

The chemical resistance of the new diaphragm makes the metering of alkalies, amines, hydrocarbons, and dilute or concentrated mineral acids possible with these differential torque transmitters.

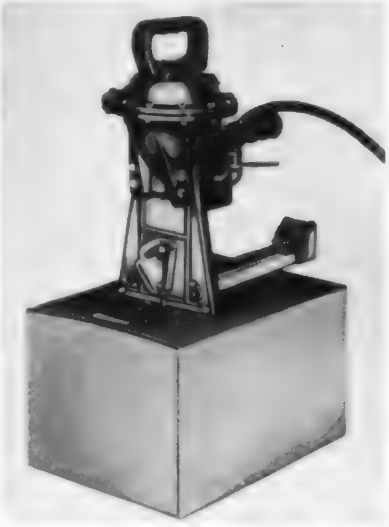
The *Teflon* coated diaphragm remains available as an option for metering substances which might attack the new diaphragm.

CLIP-TOP STAPLING

New and faster equipment for clip-top packaging has been announced by Industrial Stapling and Packaging, Ltd. The appliances use large clips of which only 2-4 are needed to seal the top or bottom of an average carton. Advantages claimed are greater security from fewer, faster operations, combined with material economy as against normal staples, tapes, wire or steel banding.

Model *PLH* automatic is primarily for sealing filled cartons from on top. It can also be used for bottom sealing of empty or filled containers. Powered from any normal source of compressed air, it incorporates a mechanical trip which drives the large staple, clinches it and retracts the anvil instantaneously. It is capable of up to 400 actions per min.

The diaphragm chamber is of advanced design with only one moving part which develops no friction. No lubrication is required. High tensile return springs are said to give reliable service under the heaviest working conditions.



The " Industria PLH " automatic carton stapling machine supplied by Industrial Stapling and Packaging, Ltd.

Model *C-F* is designed for closing the bottoms of empty cartons, and can be used with the top sealers.

GF is foot-operated, employing a toggle action which gives very fast operation of the head in response to a light touch on the operating treadle. The carton is opened out, turned over, and placed over a pillar for clipping. Any normal size carton can easily be dealt with.

VACUUM CLEANER

A new industrial vacuum cleaner, the *6X3*, has been introduceed by the Sturtevant Engineering Co., Ltd., who claim that it fills the gap between the small industrial machines and the larger and more cumbersome ones.

The power unit is a 3-stage turbo-exhauster, with silencer, driven through a V-rope from a 3 h.p. continuously-rated, squirrel-cage motor, suitable for A.C. 3-phase 50 cycles supply. A direct-on-line push-button starter controls the motor. The dust receiver is of vertical design, fitted with a textile filter screen and a hand-operated shaking gear, together with an 18 in. deep removable dustbin. The chassis is of welded heavy gauge steel and has 2 fixed and 2 castor wheels, rubber tyred.

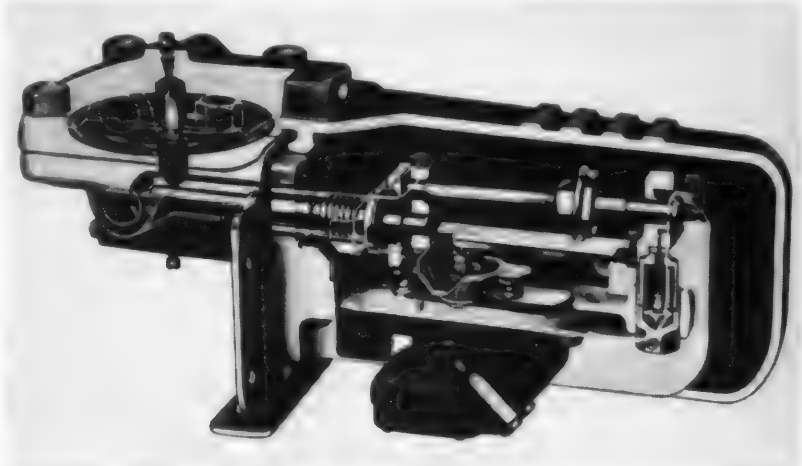
A range of accessories is provided.

TEMPERATURE RECORDER

After extensive field trials under working conditions, Fielden Electronics, Ltd. have announced their new transistorised *four point temperature recorder*. This has a 10 in. diameter chart and operates from the normal 50 cycles mains supply. Resistance bulbs are used as the temperature sensitive elements and low range spans are easily achieved.

The use of transistors has significantly reduced the power dissipated in the instrument and has resulted in improved performance and greater reliability.

The instrument is also available as a single point recorder with electrical or pneumatic control.



Improved flow and liquid level metering accuracies are claimed for this differential converter made by Honeywell Controls, Ltd.

News Digest

F.M.F. President voices Fears of Industry

At the annual luncheon of the Food Manufacturers' Federation, Inc., held at the Park Lane Hotel on May 28, the President, Mr. J. P. Van den Bergh, C.B.E., spoke of the alarm felt in the food industry at the possibility of legislation by the Government which would force manufacturers to disclose on their labels not simply ingredients but manufacturing formulæ. This, said Mr. Van den Bergh, would not be in the best interests of either the consumer or the manufacturer. He also expressed the fear that the Minister was not always advised by sound and practical men, but by "long-haired boys," medical or lay, who at times give advice not only completely impractical but which is not in the sole interests of the consumer. He urged the importance of early consultation between the Ministry and the industry, which might avoid the publication, under what appeared to be an official seal, of advice to the Minister which could entirely unnecessarily bring an industry into disrepute. He pointed out that there are a lot of products bought not for their nutritive value at all but for their palatability, and whereas the Federation was at one with the Ministry in the question of banning the use of harmful substances in food, when a substance was not shown to be harmful but which added to attractiveness and palatability, the Federation said it should not be banned.

The chief guest at the luncheon was the Minister of Agriculture, Fisheries and Food, the Rt. Hon. John Hare, O.B.E. In his reply to the President's speech, Mr. Hare said that one of his responsibilities was the protection of the consumer, and in this particular aspect it was the job of the Food Standards Committee to advise him. He expressed his gratitude for the continued and willing co-operation his Ministry had received from the food trade. The food situation in this country had improved enormously in the last five years, and in that time *per capita* consumption of butter had increased by 54%, carcase meat by 29%, sugar by 17%, eggs by 13% and poultry by 70%.

Only in perhaps New Zealand and Denmark could people boast that they were as well or as cheaply fed as the people of the U.K.

Peterhead cannery extension

Preliminary site preparations for the construction of a quick-freezing factory at Crosse and Blackwell's canning factory in Peterhead are now under way. The extension to the factory is being built between the existing buildings and a shipbuilding yard on Smith Embankment, and the factory will include a low temperature store of 250 tons capacity operating at −20°F.

The enterprise is limited in scope and is intended primarily to improve the firm's own herring canning operations, but it is expected also to provide some quick-freezing facilities outside their own domestic needs which will be available for production of frozen packs for sale in the appropriate markets.

This Peterhead organisation is being geared to take 25,000 crans of herring during the summer season. Commenting on the new venture, Mr. George E. Copeman, factory manager, said that the building and plant would cost between £150,000 and £160,000, and it would employ over 100 workers—men and women. Although the enterprise was limited in scope, provision had been made in their building plans for a considerable expansion if the initial venture was successful.

He explained that the equipment for quick freezing was capable of enabling all kinds of fish to be handled. They were likely to go into production at the end of the year. Before then, however, Mr. Copeman hopes to arrange a series of consultations with the local fishermen to see what can be done with regard to selling a greater proportion of their catches at their home port instead of having the fish consigned to Aberdeen for auction.

Co-op. jam factory closing

Believed to be the last jam factory in the country operated by a co-operative retail society, the Plymouth Co-operative Society's jam factory, once famous for its strawberry jam, is to close after 44 years.

Before the last war, when the factory employed 50 people, they used to boast: "Strawberries today and jam tomorrow," the strawberries being supplied by growers in the Tamar Valley.

The run-down of the factory has been gradual and now there are only nine employees who will be accommodated in other parts of the firm's grocery department.

It is thought that one of the reasons behind the closure is that the demand for jams and marmalade has dropped considerably owing to the increased popularity of breakfast cereals.

The society will in future get all their jam from the C.W.S., Ltd.,

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Dry fondant

Tate and Lyle, Ltd., have launched a new product called *Drifon* and supplies were available after the Whitsun holidays. The product is a dry fondant, composed of 90% sucrose, 5% levulose and 5% dextrose, and resembles a dry, soft milled sugar.

The fondant is reconstituted by adding 11 lb. water to each 1 cwt. Tate and Lyle say that the water may be added at any temperature but the ideal temperature for dipping gateaux or enrobing is 108°F. Some of the advantages claimed are that: it combines easily with other food products such as fresh fruit juices, fats, cocoa, dairy produce, etc.; it handles easily with no papers to take off; storage presents no problem as it is taken straight from the bag to the mixer and; it is economical.

By using water, 123 lb. of fondant is obtained from 112 lb. of *Drifon*. If a further increase in coverage is required it is possible to achieve this by the use of simple syrup. By this means, up to 140 lb. of fondant is obtained from 112 lb. of *Drifon*.

The fondant is packed in 28 lb., 56 lb. and 1 cwt. multi-ply paper with a polythene sprayed liner, and special delivery arrangements are available.

Arsenic in food regulations, 1959

On August 10, 1959, regulations relating to the arsenic content of food, based on recommendations of the Food Standards Committee, will come into operation in England and Wales. The regulations lay down statutory limits for the arsenic content of food and beverages imported, sold or intended for sale for human consumption.

The regulations limit with certain exceptions the arsenic content of ready-to-drink beverages to 0·1 p.p.m. and of foods to 1·0 p.p.m.

The Secretary of State for Scotland proposes to make corresponding regulations which will apply in Scotland and similar regulations for Northern Ireland are under consideration.

Mr. M. T. J. Goff

Mr. J. Busfield

Mr. R. J. Hutt

Mr. E. Waller

Mr. E. E. C. Harvey

Mr. L. S. Yoxall

PEOPLE

MR. J. BUSFIELD, A.C.A., recently appointed secretary and chief accountant for Crofts Engineers (Holdings), Ltd., and Crofts (Engineers), Ltd., has been appointed a director of Crofts Engineers (Holdings), Ltd., Crofts (Engineers), Ltd., and J. Parkinson and Son (Shipley), Ltd. Mr. Busfield joined Crofts in 1950 as assistant secretary and chief accountant.

MR. M. T. J. GOFF, joint managing director of Crofts (Engineers), Ltd., and a director of Crofts Engineers (Holdings), Ltd., has also been appointed a director of J. Parkinson and Son (Shipley), Ltd.

*

MR. W. A. WATTS who has been for many years director and factory manager of Bowyers (Wiltshire Bacon), Ltd., Trowbridge, Wiltshire, has been appointed assistant general manager.

*

At a recent meeting of the Nutrition Society MR. A. L. BACHARACH was elected president in succession to Dame Harriette Chick, D.B.E. PROF. R. G. BASKETT, O.B.E., MR. F. LE GROS CLARK, DR. H. N. MUNRO and DR. F. YATES, F.R.S., were elected ordinary members of council.

*

MR. G. A. STONESTREET has retired after serving 36 years and rising to become vice-chairman of T. Wall and Sons, Ltd. He joined the company in 1923. He was assigned to general managerial duties at first, working with ice cream in the summer and meat in the winter. In 1924 he was made "honorary" deputy director. In those days the ice cream machinery was set up in one corner of the meat factory, in the butcher's boning department. He was made a full director of the company in 1929, when its operations were changing fast.

In 1942 Mr. Stonestreet was made joint managing director of the company and in 1947 he became managing director. In the reorganisation which occurred in 1957 Mr. Stonestreet became vice-chairman of the Wall's group.

MR. ROBERT J. HUTT has been appointed general sales manager of Batchelors Foods, Ltd. He joined Batchelors in January from Van den Berghs, Ltd., for whom he was a sales district manager in the Highlands of Scotland.

He entered the Army from Birmingham University in 1941 and took a regular commission in 1944. He served in India, Burma and Germany and was commanding officer of 661 Air Operation Post squadron in Britain from 1949 to 1953 when he joined the Unilever organisation.

*

MR. ERIC WALLER, an executive director since 1948, has been appointed to the board of Ross Group, Ltd., (previously Trawlers Grimsby, Ltd.). He joined Ross Group on leaving the Army in 1946 and his work has been mainly connected with the development of the Group's quick freezing activities and sales expansion at home and overseas. He is 42 and apart from his war service has been connected with the fish industry all his life. Mr. Waller is a past president of the National Federation of Fish Quick Freezers and is a member of the Executive Council of the National Association of Frozen Food Producers.

*

MR. JOHN REAVILL, M.S.M.A., has been appointed sales director to Tyne Brand Products, Ltd., and also director in charge of export.

*

MR. J. K. BREW, representative for Peerless and Ericsson, Ltd., in Northern Ireland, recently has been appointed chairman of the Bakery Students' Association in Northern Ireland for 1959.

All books reviewed in FOOD MANUFACTURE as well as any other scientific or technical book may be obtained from:
Technical Books
308, Euston Road
London, N.W.1.
Tel: Euston 5911.
Prompt attention is given to all orders.

MR. EDWARD C. C. HARVEY has been appointed senior project engineer responsible for Sharples Centrifuges, Ltd.'s activities in south-east England. He was originally with the British Petroleum Co., Ltd., at their Abadan refinery and more recently with Shell Mex B.P. His appointment is part of recent re-organisation which Sharples have made.

*

MR. LAURENCE S. YOXALL, managing director of Foxboro-Yoxall, Ltd., has joined the board of directors of the Foxboro Co., Foxboro, Massachusetts, U.S.A. He, in addition to his present duties, becomes directly concerned with the operations of Foxboro Co., U.S.A.; Foxboro Co., Ltd., Canada; the new plant being built for Foxboro (Nederland) N.V., Holland, and the Foxboro interests in Japan.

*

Obituary

The death has occurred, whilst on holiday in Spain, of MR. J. W. GOSHERON, founder, chairman and managing director of John Gosheron and Co., Ltd. He was 72. The company was founded in 1909 in the City of London, where Mr. Gosheron was a freeman, as was his father before him. The firm celebrated its jubilee this year.

Mr. Gosheron, who was a keen sportsman, is survived by his widow, five sons and a daughter.

*

The death is announced of HERR HEINZ MEINECKE, manager of Q.V.F. Glastechnik, Wiesbaden, Germany, a subsidiary of Q.V.F., Ltd.

Herr Meinecke had been manager of Q.V.F. Glastechnik since its inception in 1956.

*

The death has occurred of MR. W. C. PORTER, south of England dairy sales engineer of the A.P.V. Co., Ltd. He had been with the company for 33 years. He was taken ill during the National Dairymen's Conference at Brighton and had to be taken to hospital.

Mr. Porter, who was 59, leaves a widow and two daughters.

Cadbury's raise exports

Cadbury Brothers, Ltd., has stepped up its export trade by more than 5% and raised the total group turnover of more than £84,000,000—a record—some £1,500,000 higher than the previous year. Mr. L. J. Cadbury, chairman, said that "The falling prices of commodities such as copper, rubber, coffee, tin, though helpful to our national economy, affected sales in Rhodesia and other producing countries."

Joint Cadbury-Fry dollar exports topped the £1,000,000 mark with sales of chocolate-covered biscuits to Canada and the U.S.A. increased by nearly 500 tons.

Increases in cash sales last year were recorded by all of their overseas companies, and, apart from a slight fall in Canada, the tonnage was increased as well. The turnover of the overseas factories, £16,500,000, was a record.

Cadbury agents have recently visited East Africa to examine the possibilities of growing cocoa there, and India at the request of the Indian Government to look into the possibility of the growing of both cocoa and oil-palms. Their own plantation in the British Cameroons at Ikiliwindi is making steady progress. The news from Malaya was disappointing for the newly-planted cocoa is retarded in growth, due probably to a fungus.

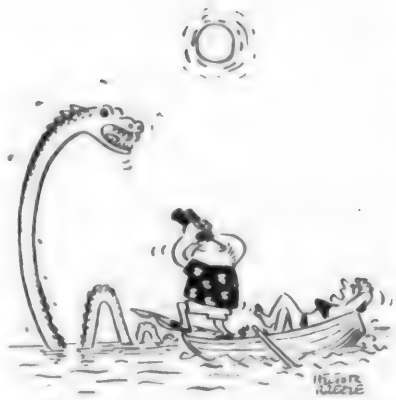
The firm's latest investigations have been in Borneo where the soil, climate and rainfall appear to be ideal for cocoa growing.

The construction of a new office block at Bournville had begun, said Mr. Cadbury, though, as had been the case for the last few years, the main factory extensions had taken place at Moreton in Cheshire.

Bournville remains the centre of their technical and mechanical research; but other factories in the group carry out pioneer work in various directions. A completely new factory for the continuous production of milk chocolate crumb is nearing completion in Tasmania.

"Steel Town"

At the Royal Commonwealth Society's headquarters in London, recently, an audience of distinguished guests, members of Parliament and representatives of the Press gathered at the invitation of the United Steel Companies, Ltd., for the press première of the film "Steel Town." This colour film, which runs for 25 minutes, shows the activities, in work and play, of the 7,000 employees of the steelworks of Samuel Fox and Co., Ltd., at Stocksbridge, in Cheshire. The sequences show the making of special and alloy steels from the arrival of the raw materials to the despatch of the finished products. Throughout the film runs a thread of strong human interest;



"Oh, can't you think of anything else but your silly old fish paste works?"

we see the young apprentice, the foreman of the melting shop, the operators of the enormous rolling mills, and we catch glimpses also of the workers off duty. This and other United Steel films are available on free loan to trade associations and other interested bodies.

Wigan production

Production has started at the new factory at Goose Green, Wigan, belonging to Reed Corrugated Cases, Ltd.

This factory when working to capacity will employ about 800 people.

Compressor manufacturers

Joy-Sullivan, Ltd., have formed an air power division for the manufacture of compressors and compressed air equipment, including equipment suitable for the food industry. The address is: 7, Harley Street, London, W.1.

Quality control

A residential course on quality control in the food industry is to be held by the Department of Food Science of the Royal College of Science and Food Technology, from September 7-11.

The course will attempt to consider the "Know how" of setting up and operating a quality control system rather than the laboratory techniques used.

New drink from whey

Horlicks, Ltd., have introduced to this country *Rivella*, a non-alcoholic drink, under an agreement with Rivella International.

The drink, which comes from Switzerland, is derived from whey and flavoured with mountain herbs and fruits. It does not contain chemical preservatives and has no artificial flavouring or colouring ingredients. Rivella costs 9d. for a small and 2s. 6d. for a large bottle.

Technical Press Review

July

Dairy Engineering.—Special Issue: The International Dairy Congress; A Message from the Publisher; The International Dairy Congress and the International Dairy Federation; British Dairy Industry at Home; Looking Back on Achievement; The Literature of Dairying; Milan's New Market Milk Plant; Dairy Engineering Progress in Australia.

World Crops.—Special Issue: Weed Control; Chemical Weed Control in Vegetable Crops; Mechanical Eradication of Couch and Twitch; Boron Deficiencies; Citrus Cultivation.

Manufacturing Chemist.—Special Issue: Laboratory Furnishing; Laboratory Design and Layout; Design of Microbiological Laboratories; Review of Laboratory Furnishing and Fitting; "Home-Made" Analytical Equipment Demonstrated; Glycols and Polyglycols—II; The Search for Insulin Substitutes; Antioxidants for Soap; Emetine and Related Alkaloids; Progress Reports: Pest Control Chemicals; Analytical Chemistry.

Paint Manufacture.—Paint Industry in Germany; Polishing Cellulose and Polyester Lacquers; Polythene Glycols in Paints and Inks; Chemistry of High Polymers.

Petroleum.—Molecular Sieves—New Refinery Tool; History and Development of U.S. Pipelines; History of Natural Gas Transmission; Determination of Acidity in Dark Lubricating; Combination Coking Unit Utilising Belayim Crude.

Chemical and Process Engineering.—Welding and Fabrication of Chemical Plant: Review; Theory and Design of Pneumatic Transport Systems—I; The Chemical Engineer in Charge of a Development Station; Complete Concentrated Fertiliser Plant; Computers Help in Design and Operation of Process Plant.

For specimen copies write to Leonard Hill House, Eden Street, London, N.W.1.

Hygiene courses

The next series of full-time three day courses in "Food hygiene and the handling of food" conducted by the Royal Institute of Public Health and Hygiene will be held at 28, Portland Place, London, W.1, and will commence on: October 19, November 2, 16 and 30. The examination date is Monday, December 7.

Full particulars may be obtained from the above address.

Food News Overseas

Scandinavian frozen food sales

Sales of Scandinavian deep-frozen food products in the European countries have increased very satisfactorily in the first four months this year, according to Mr. Olaf Ogren, managing director of the leading Swedish exporter, Findus International. In England, he said, such products are sold in 55,000 shops and in West Germany in about 15,000. In order to meet the growing demand, it will be necessary to increase the capacity of the Findus plants in Sweden as well as in Norway and Denmark in the near future.

U.S.S.R. third largest fat producer

Production of fats and oils has been rising in the U.S.S.R. and it is now thought to be the third-largest producer in the world after U.S. and Mainland China. For 1958, the estimated production is 2·6 million metric tons, edible vegetable oils accounting for the main share of the output, followed by lard and tallow, butter, and fish and whale oils, according to the F.A.O.

The total production of edible vegetable oils, including those extracted from imported seeds, last year, is estimated at about 1·2 million tons. In 1959 it is likely to reach an all-time record.

Joint committee on food additives

A joint committee of the Food and Agriculture Organisation and the World Health Organisation has made a move towards indentifying and establishing standards of purity on an international basis for commonly-used chemicals which are added to many foods.

The joint FAO/WHO expert committee on food additives which met in Rome last December has begun to draw up provisional specifications for a number of the more important food additives, with special reference to anti-microbials preservatives (used in fruit juices, jams, etc.) and antioxidants (used for stabilisation of fats and oils). Earlier meetings of the joint committee had agreed that food additives should be identifiable, and that established specifications of purity were the best means of excluding harmful impurities from food additives.

Delegates stated that specifications or standards of purity have been established for only a small portion of the large increasing number of chemical substances which are currently added to the world's food supply.

Chinese sugar refineries

Six new sugar refineries have been completed in the Kwangsi Chuang Autonomous Region to bring the region's daily processing capacity up to 5,600 tons.

Australian offshoot

J. H. Fenner and Co., Ltd., have formed a manufacturing company for mechanical power transmission goods by means of an association between J. H. Fenner and the Dodge Manufacturing Corporation of Mishawaka, Indiana, U.S.A., Fenner having 60% of the capital and Dodge 40%.

The new company is now operating in a modern factory of some 20,000 sq. ft. floor area at Revesby, New South Wales.

Australian dried fruit

The total Australian dried fruit crop of approximately 85,000 tons for this year was harvested under somewhat unfavourable weather conditions.

In Victoria, 150 farms were devastated by hail storms while other farms suffered from excessive heat. The crop was so late in ripening that farmers had only a few days to harvest it before the rains.

Despite these conditions, the crop is reported to be the biggest for four years. Price of Australian dried fruit in the U.K. should remain the same as last year.

F.M.F. at A.N.U.G.A.

The Food Manufacturers' Federation in co-operation with the Board of Trade is sponsoring a British Food Exhibit in the international section of the General Exhibition of Provisions and Fine Foods (A.N.U.G.A.) to be held in Cologne from September 26 to October 4 this year. The exhibit will be run by the British Food Fair on behalf of the Food Manufacturers' Federation.

The British Exhibit, more than 4,000 sq. ft. in area, will include many well known British manufacturers and the display will cover a very wide range of high quality manufactured foods (and drink).

This venture is, the Food Manufacturers' Federation hopes, the first part of a continuing drive to boost exports of British foods and it is hoped that there will be further joint efforts at other important overseas food exhibitions in the future.

Kellogg products for Norway

An agreement has been reached between the Kellogg Co. and the Norwegian company A/S Freia, who make chocolate, for the production and sale in Norway of three of the first company's best known products. The Kellogg Co. will place their recipes at the Norwegian firm's disposal, give technical assistance and invest about £50,000 in advertising the products.

Ghanaian palm wine

The Ghanaian Government is investigating the possibilities of developing the local distillation of spirits from palm wine into an organised industry and legalising it. A local "distiller" is to be sent to Ceylon to observe the methods of control and operation employed in similar circumstances there.

Philippine flour mill

The executive vice-president of Keljikan Commercial Corporation of New York, during a visit to Manila, stated that his company was prepared to construct a U.S. $10 million flour mill. He said that the company formed to run it would be 50% U.S. and 50% Filipino. No dollar allocations would be necessary as the New York company would supply all the necessary machinery (worth about $4 million).

25% of the company's profits would be remitted and the remaining 75% reinvested locally. The local corporation would be turned over to Filipinos at the end of 10 years and the Keljikan Corporation would take only its original investment.

Philippine fisheries development

An intense research programme, based on a research station, 9 laboratories and some 60 research workers, is helping to speed up and direct the development of the rich fisheries of the Philippines, according to Dr. Klaus F. W. Tiews, a German fishery biologist who has just completed a two-year assignment in the Philippines on behalf of FAO.

Considerable progress has been made during the past two years, he said. The research station and 9 laboratories are being equipped with the help of such organisations as the Colombo Plan, as well as by Project Development Funds from the Philippine Government. The Colombo Plan organisation is supplying $20,000 worth of equipment, and the Philippine Government are providing $75,000 for financing the laboratories.

Packaging

Tube closure

The Flexile Metal Co., Ltd., have added another closure, the 115, to their range of *Flower Pot* caps. The closure is available in polythene, and is intended for capping metal or plastic tubes.

Instant coffee pack

The latest development in the packaging of "instant coffee" is expected to carry the sales of the commodity still further. The Owens-Illinois Glass Co., of Toledo, Ohio, has introduced a high-shoulder soluble coffee jar with a *Deep Cap* closure containing a *Tacseal* tamper-proof inner seal.

Packing the coffee in a glass jar will allow the consumer to see at a glance just how much coffee is inside, while the inner seal on the closure provides special protection for the volatile oil in the coffee. The seal is a special kind of membrane liner which adheres to the glass surface.

The jars are made in several sizes and are undergoing tests with coffee packers.

Ten years of British Pliofilm

Pliofilm, the transparent packaging film developed by the Goodyear Tyre and Rubber Co., recently celebrated its tenth anniversary as a British manufactured product. Since production of this rubber hydrochloride film began at the Wolverhampton plant in 1949 it is estimated that some 35,000 miles have been produced.

Made in a range of grades to suit many applications, *Pliofilm* is used to pack fresh meat, poultry, cheese, and many toilet and pharmaceutical goods. Two of its toughest tests were its use by the Everest expedition in 1953 and the Trans-Antarctic expedition in 1957.

In the Everest expedition *Pliofilm* was used for the packing of provisions and confectionery; and in the expedition to Antarctica two Auster aircraft were shipped to the Pole in *Pliofilm*, one in its entirety and the other stripped down into parts.

Norwegian fish packs

By adopting printed transparent cellulose film bags, two Norwegian firms are believed to have greatly reduced their costs in exporting sun-dried, salted codfish to Central and South America. The firms concerned are Werring and Son A/S, and Lorentz A. Lossius, both of Kristiansund, Norway.

A lemon-flavoured multi-vitamin preparation, "Vi-Daylin," is now being marketed by Abbott Laboratories of Chicago in this aerosol container.

The bags replace cartons and are said to be cheaper, lighter and need less shipping space. The cellulose film *MSAT 300/30* is made by British Cellophane, Ltd., who say that it protects the dried fish against moisture absorption, while allowing it to be seen. For shipping, the packs are bulked in cartons and wooden cases.

Satchel-type bags, 6¾ in. sq. with 1½ in. gussets, are used. Each holds ½ kilo of fish. Werring's bag is printed in red and green, and produced by Colodense, Ltd. The other bag, for Lossius, is printed in red and blue and produced by Otto Neilsen Emballage, A/S, Copenhagen. Both bags are closed by crimp-sealing under heat.

A high-shoulder jar for instant coffee with Tacseal tamper-proof inner seal, made by Owens-Illinois Glass Co.

Multi-vitamin preparation

A multi-vitamin preparation is now being marketed in an aerosol container by Abbott Laboratories of Chicago. Known as *VI-Daylin*, the product is lemon-flavoured and intended primarily for children.

The dispenser, which is brightly coloured, has a push button protected by a white plastic top. The problem of finding an aerosol container which would propel a heavy liquid and yet not take up too much room or be too expensive was solved by making use of nitrogen as a propellent and designing a new type of valve.

The heavy liquid was found to flow easily and smoothly from the spout. The container is also shaped so that there is very little waste of the product.

The pack contains 12 oz. and the firm are trying to adapt the container for smaller amounts.

New Companies

Egi (Great Britain), Ltd. (625615.) 6, Stratton Street, London, W.1. Mnfrs. of and dlrs. in coffee grinders, coffee making machinery, etc. £100. Subs.: R. V. H. Dixon and R. S. Staplehurst, 4, Throgmorton Avenue, London, E.C.2.

Hadfields (Bakers), Ltd. (624126.) 521, Wakefield Road, Dalton, Huddersfield. £1,000. Dirs.: John and Mrs. Florence M. Hadfield.

Harringtons (Candies), Ltd. (624329.) 97, Camden Road, Tunbridge Wells, Kent. £3,000. Dirs.: H. J. F. Harrington and F. W. J. England.

J. and M. Harwood, Ltd. (624729.) 9, Norfolk Row, Sheffield. Confectioners, mnfrs. of and dlrs. in sweetmeats, edible rock, ice cream, etc. £1,000. Dirs.: James and Mrs. M. Harwood.

Holborn Bakeries, Ltd. (624187.) 50, Lambs Conduit Street, London, W.C.1. £10,000. Dirs.: George C. Lawton (gov. dir.), Mrs. E. and K. F. Lawton.

How and Porritt, Ltd. (624635.) To carry on the bus. of mnfrs. of and dlrs. in orange drinks, etc. Subs.: Jean and Thos. A. Herbert, 156, Strand, London, W.C.2.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

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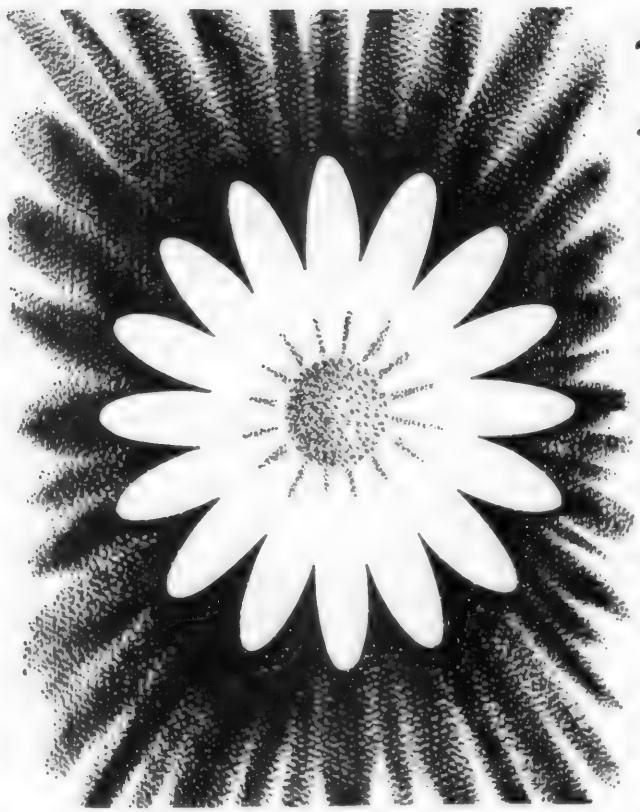

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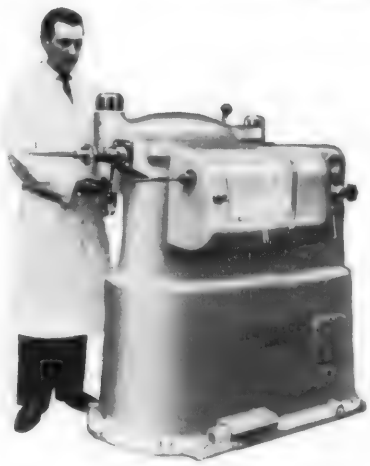

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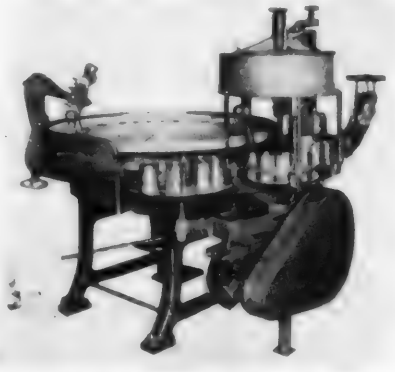

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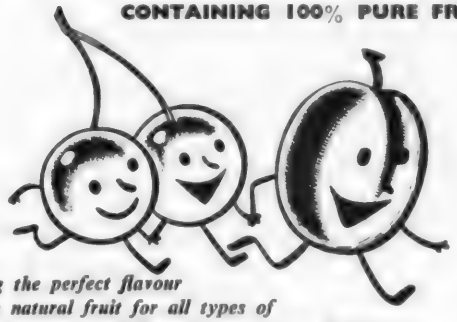

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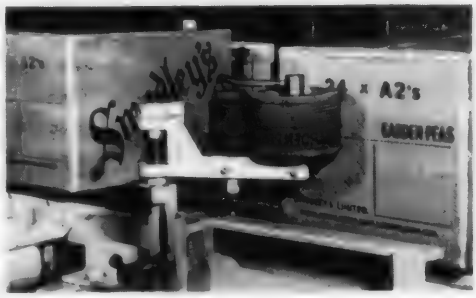

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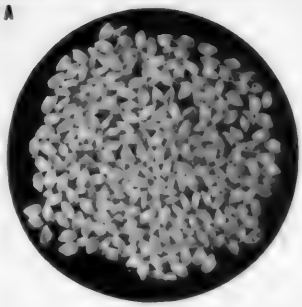

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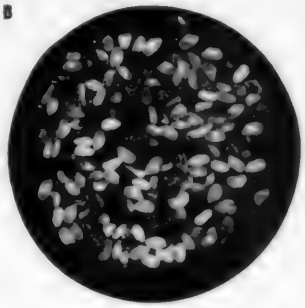

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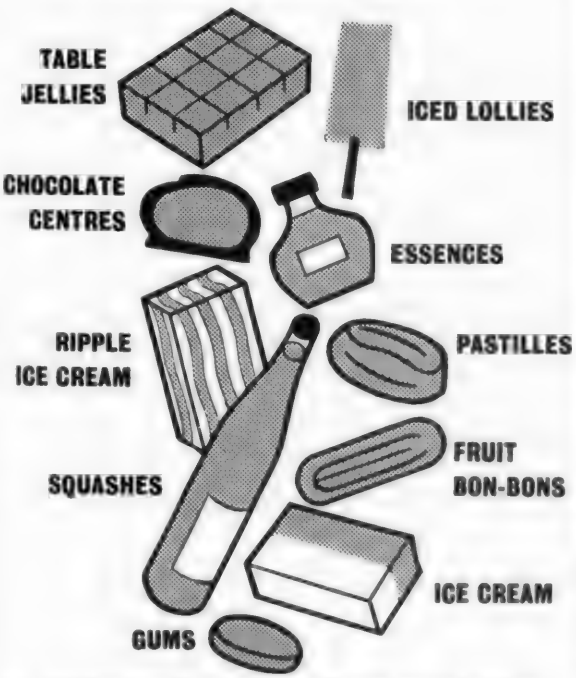

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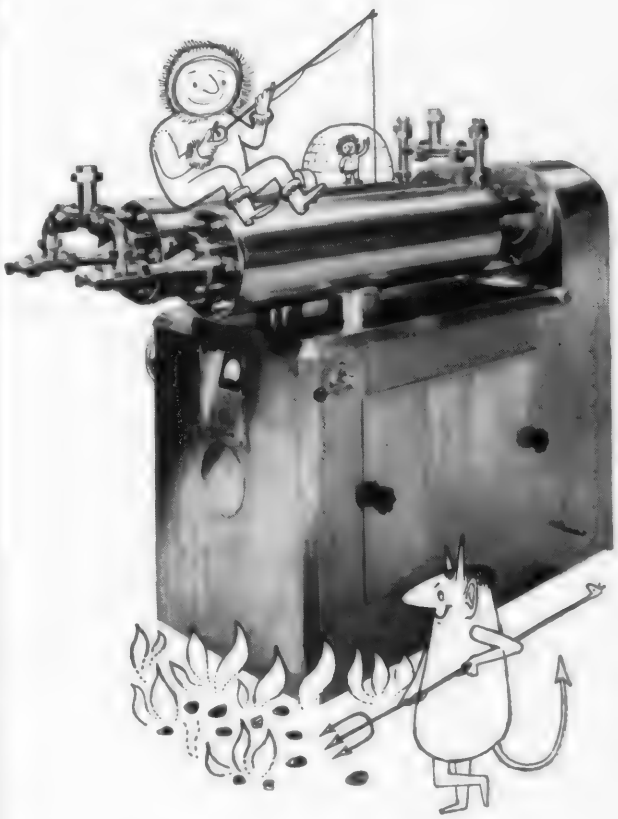

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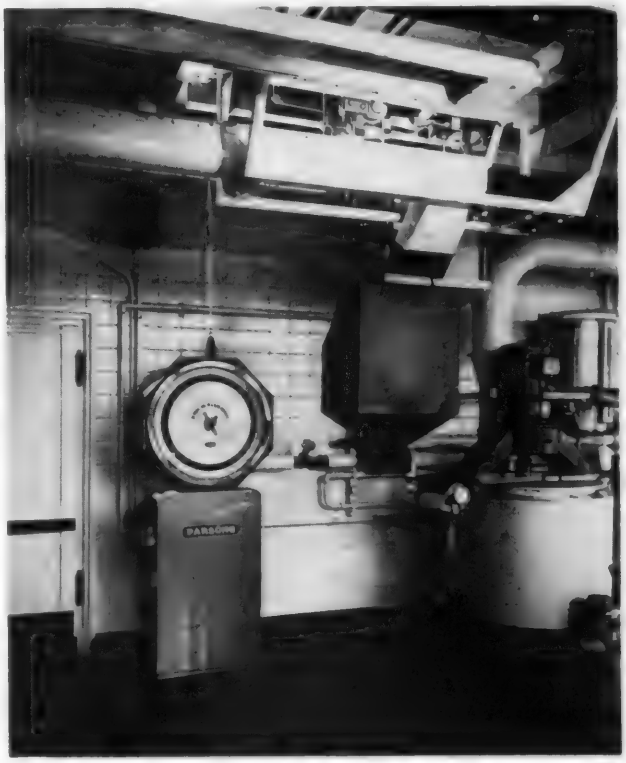

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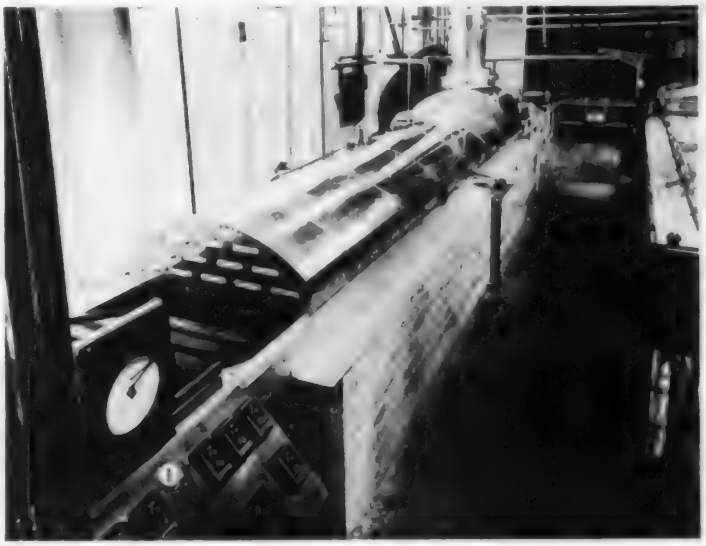

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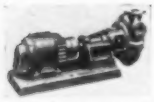

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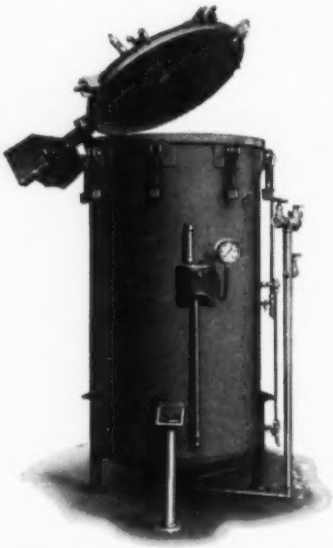

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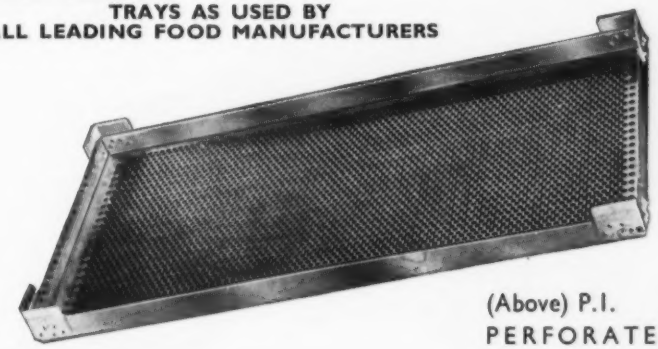

(Above) P.I.
PERFORATED
INTERSTACKING
ALUMINIUM TRAY

S.4 (above)
SOLID BASE DOWNWARD INTERSTACKING ALUMINIUM WORKING TRAY

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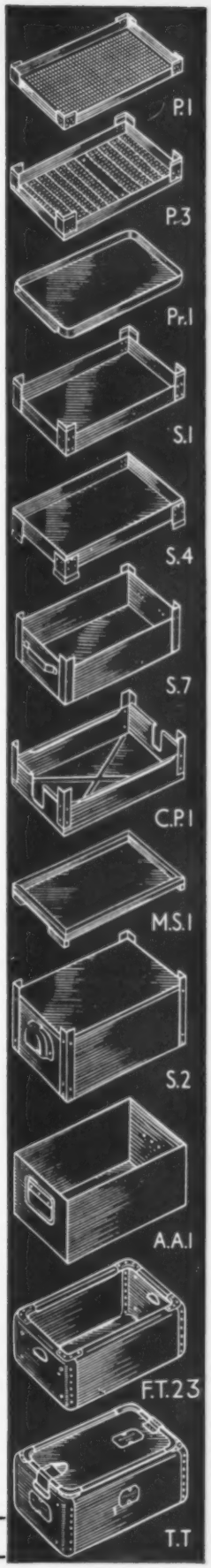

Enquiries for illustrated details to Department F.M.

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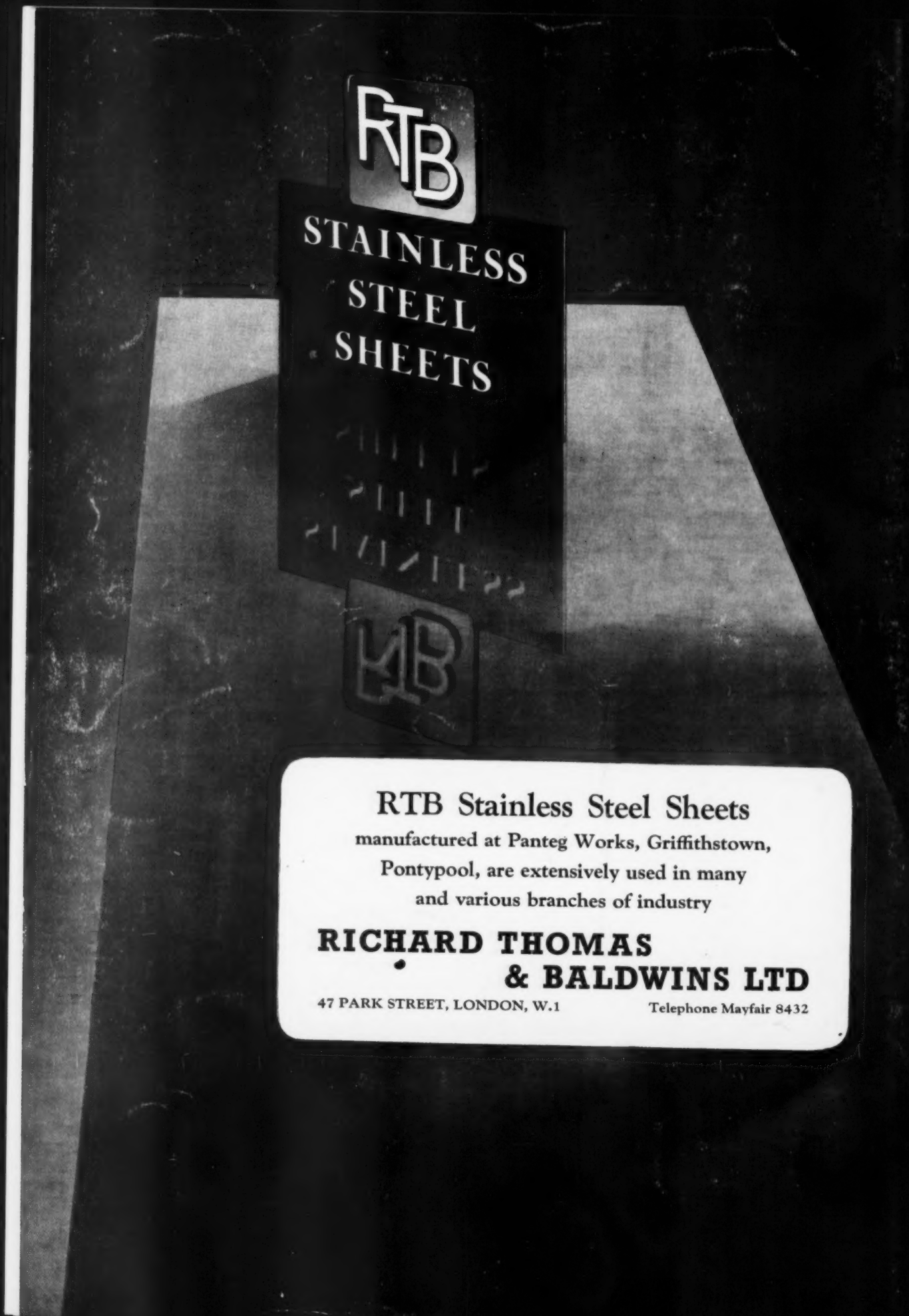

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